

EDITOR
ASSOC. PROF. DR. AYSEL KIZILKAYA

INTERDISCIPLINARY PERSPECTIVES IN PHYSICAL EDUCATION, SPORT, AND RECREATION: THEORETICAL APPROACHES AND CONTEMPORARY PRACTICES

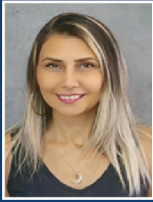


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EDITOR

ASSOC. PROF. DR. AYSEL KIZILKAYA



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Preface

Physical education and sport have increasingly gained importance as multidimensional fields of education that support not only individuals' physical development but also their cognitive, affective, and social development. The growing awareness of healthy lifestyles, a better understanding of the effects of physical activity on quality of life, and the increasing emphasis on holistic development within educational systems have further enhanced the value of scientific studies in the field of physical education and sport. In this context, bringing together theoretical and practice-oriented research contributes significantly to the development of the academic literature.

This book aims to bring together current approaches, diverse research topics, and interdisciplinary perspectives in the field of physical education and sport sciences. Prepared with the contributions of scholars working in the field, this work seeks both to contribute to the academic literature and to serve as a scientific reference source for researchers, teachers, and students.

I would like to thank all the authors who contributed to the preparation of this book for their valuable work, and I hope that this study will contribute to future research in the field of physical education and sport sciences.

Editor

Assoc. Prof. Dr. Aysel KIZILKAYA

Elazığ, 2026

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CHAPTER 1

From Ritual to Festival: The Historical Origins of Recreational Activities and Effective Experience Design

Mert Testere¹

Abstract

This study aims to examine the historical origins of the symbolism of numbers, the transformation that this symbolism has undergone over time, and its effects on today's recreational activities. Today, the organization of many activities such as festivals, celebrations, commemorative days, sports organizations, and similar events on specific dates, within specific time cycles, and often in recurring periods shows that these activities are related not only to organizational preferences but also to a historically and culturally deep-rooted perception of time. It is seen that an important part of these time cycles was shaped through cosmological and symbolic number systems based on theological and religious foundations in past periods. The fact that numbers carry sacred, auspicious, or symbolic meanings appears before us within a broad historical line extending from pagan beliefs to shamanic practices, and from there to institutionalized religious and cultural rituals. In this context, the performance of rituals, celebrations, and collective ceremonies within specific numbers of repetitions and within specific days and time intervals is directly related to number symbolism. Such practices emerged as an inseparable part of

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recreational activities in past periods; over time, by changing form, they have continued to exist within festivals, commemorative events, sports organizations, and even yoga and similar practices in the modern world. Therefore, this study aims to reveal how number symbolism, time cycles, and collective activities are intertwined in the historical process extending from ritual to festival; and to discuss the effects of this continuity on the shaping and perception of today's recreational activities from a cultural and historical perspective. In this respect, the research aims to make an interdisciplinary contribution to the field by addressing the relationship of ritual, culture, and recreation together.

Keywords: Ritual, Festival, Recreation, Historical Foundations, Experience Design

1. Introduction

Throughout human history, the practices of having fun, coming together, celebrating, and spending time together have existed not only as leisure-time activities; but also as cultural mechanisms that strengthen social bonds, detach the individual from the ordinariness of daily life, and provide psychological renewal (Demirtaş, 2025). This broad historical line, extending from the seasonal festivities of pagan periods to ancient rituals, from the toy and şölen in Turkish culture to the great public festivities in the Ottoman period, and to today's festivals, concerts, and sports organizations, shows that human recreational needs have gained continuity by changing form (Taşkiran, 2021). Although in modern literature the concept of "recreation" is mostly addressed in the context of resting, having fun, and evaluating leisure time, when looked at from a historical perspective, there are much deeper layers of meaning at the origin of these activities (Testere, 2025). In early communities, rituals, ceremonies, and festivities did not serve only the purpose of entertainment, but also fulfilled the functions of purification, wishing for abundance, reinforcing community consciousness, and establishing contact with the sacred (Özdemir, 2025). In this respect, recreational practices can be considered as one of the oldest collective forms of behavior in human history.

Over time, these practices, whose relationship with the sacred weakened, have continued to exist in the modern world under more secular forms. Today, music festivals, sports competitions, holiday rituals, nature camps, and similar organizations, although they appear modern in form, carry largely similar characteristics to the ritual and festivity cultures of the past in functional terms (Testere, 2025). Human beings now gather not for gods, but for themselves; however, in the same way, they go outside daily life, become a part of a collective experience, and return from this process with emotional renewal.

This study aims to address recreational activities not only as practices belonging to modern times, but as the product of a cultural continuity spread throughout human history. Starting from pagan periods, traditional entertainment and ceremonial practices in Turkish culture, the understanding of public festivities in the Ottoman period, and the festival and organization culture in the modern world will be evaluated within a line extending “from ritual to recreation”.

At the same time, the study will not remain limited to only a historical description; it will also aim to present a conceptual framework regarding how recreational activities can be constructed in a more effective and meaningful way, through the common structural characteristics of these collective activities that have been effective throughout history (Çetinkaya, 2018). In this context, it will be argued that a successful recreational experience should be considered not only as entertainment, but as a holistic process based on stages such as preparation, separation, threshold experience, emotional intensification, and return (Çevik, 2018). In this respect, the study aims to position recreation not only as a leisure-time activity, but as a cultural reflection of the human being’s search for meaning, need for being a community, and desire for psychological renewal throughout history (Testere, 2025).

2. Ritual and Festivity Culture in Pagan Periods: The First Forms of Recreation

From the earliest periods of human history, the fragile position of communities in the face of nature directed them to establish relations with invisible powers and to influence these powers through various ceremonies (Küçük, 2013). In this context, the rituals that emerged in pagan periods were shaped not only as a reflection of religious beliefs; but also as holistic practices that responded to the psychological, social, and bodily needs of the individual and the community (Ünal & Göregen, 2024). A significant part of these rituals, when evaluated with today’s conceptual framework, carries qualities that can be read as early recreational activities.

In primitive and early agricultural societies, elements such as seasonal cycles, fertility, the abundance of hunting, and the productivity of the soil constituted the main theme of collective ceremonies (Gün, 2024). Spring and harvest festivities, dances performed around fire, performances made with masks and costumes, collective movements performed with music; while on the one hand carried the purpose of establishing contact with sacred powers, on the other hand offered community members the opportunity to move away from the anxieties of daily life, to have fun together, and to experience emotional discharge (Aytan, 2021). In this respect, these ceremonies are practices that

fulfill both ritual and recreation functions at the same time (Gün, 2024). One of the most striking features of the rituals of this period is that the body is taken to the center (Özdemir, 2022). Dance, rhythmic movement, running, jumping, and repeating figures aimed to take the individual out of the ordinary state of consciousness and carry them to a different field of experience. This situation, which is frequently defined in the anthropological literature as “trance” or “state of ecstasy”, is explained as the individual transcending himself, temporarily stripping away his daily identity, and being included in a collective state of mind. This process can be considered as the historical precursor of the experiences of “relaxation”, “purification”, and “renewal” seen in today’s recreational activities (Cengiz, 2022).

It is also striking that festivities and rituals in pagan societies were performed at certain times and within a certain order. These events often consist of a preparation process, then a break from daily life, afterwards an intense and enthusiastic experience, and finally the stages of returning to normal life. This structure has a surprisingly similar construction when compared with modern festivals and large organizations. Therefore, when looked at historically, it can be said that successful collective events gain meaning not only with their content, but also with their process design (Kılıç, 2023). In addition, an important social function of these rituals and festivities has been to strengthen the sense of belonging. Eating together, dancing together, singing together, and repeating the same symbolic actions have enabled the community to feel itself as a whole (Testere, 2025). In this respect, early period rituals functioned not only as a means of individual relaxation; but also as a powerful cultural mechanism that provided social integration (Gülgen, 2023). When all these features are taken into consideration, it can be said that the rituals and festivities that emerged in pagan periods constituted the historical and cultural foundations of recreational activities in the modern sense. Although forms and belief systems have changed, the human need to have fun together, to become enthusiastic, to be purified, and to go outside daily life has preserved its existence. This continuity shows that recreation is a requirement inherent in human nature and that it has been reproduced in different forms throughout history (Ünal & Göregen, 2024).

3. Toy, Feast, and Game in Turkish Culture: Traditional Forms of Recreation

In Turkish culture, phenomena such as having fun, coming together, and celebrating have not been seen throughout history only as activities of evaluating leisure time; they have also been evaluated as cultural elements that

fulfill the functions of establishing social order, transmitting collective memory, and psychologically renewing the individual (Özdemir, 2025). Especially in Turkish societies where the nomadic and semi-nomadic way of life was dominant, recreational activities did not emerge as independent and random events from daily life; but as regular activities whose time, place, meaning, and symbolic framework were determined in advance (Demirtaş, 2025). In ancient Turkish societies, toy and feasts are among the most important examples of recreational activities. Toys; after wars, after great hunts, during seasonal transitions, or after important social events, provided the community to come together as important gatherings that were organized (Güngör, 2023). These events made it possible for people to have fun together, to celebrate, and to relax emotionally. In toys, food, music, dance, and games are intertwined; at the same time, they are exhibited in various performances and games specific to Turkish culture (Gürbüz, 2024). In this respect, toys can be considered as the historical counterpart of festival and festivity culture in the modern sense.

Another important dimension of recreational formations in Turkish culture is games and sports activities. Bodily activities such as equestrian sports, archery, wrestling, and javelin are not only activities aimed at developing warrior skills; they also created aesthetic and social spaces that brought together social togetherness, cohesion, competition, and entertainment (Pektaş, 2025). These activities allowed the individual to discharge bodily energy, to express himself, and to gain visibility within the community. Today, the evaluation of sport as a recreational activity is in the nature of the continuation of this historical experience (Testere, 2025). Although the concept of shamanism is discussed as a “belief system”, since it is handled in this way in the literature, this framework is also preserved here. The rituals shaped around the shaman belief system constitute an important part of the understanding of recreation in Turkish culture. Ceremonies performed with drums, rhythmic movements, and repeating oral narratives enabled the individual to move from the state of daily consciousness to a different field of experience (Düzgün, 2025). In this process, music, movement, and narrative come together and allowed the individual to relax, to increase the intensity of experience, and to move to a different state of consciousness (Testere, 2025). In this respect, shaman rituals can be read as the cultural precursors of meditation, yoga, and rhythmic exercise practices seen in the modern world.

The Turkish epic tradition and oral culture are also an important component of recreational practices. Epics transmitted with *kopuz*, collective listening experiences, and narrative practices not only provided entertainment; they also reinforced the common values, historical memory, and cultural identity of the community. These narrative practices can be considered as the historical

origins of recreational activities such as theatre, concerts, and performing arts today. Another remarkable feature of recreational activities in ancient Turkish societies is that these activities were carried out within a certain time order. The use of the twelve-animal Turkish calendar shows that such activities were carried out in certain periods of the year and in a certain order (Çubuk & Eren, 2023). Toys and feasts are mostly organizations that are announced in advance, have a preparation process, and pass through certain stages (Güngör, 2023). This situation reveals that these events were carried out beyond being a simple entertainment activity, within the framework of a social order and norm. Stages such as preparation, gathering, the activity process, and dispersion appear in a similar way in today's recreational organizations (Testere, 2025).

As a result, practices such as toy, feast, and game in Turkish culture; while meeting the individual's need to have fun, rest, and renew, have also functioned as strong cultural tools that ensure social integrity. These practices clearly reveal that recreation is not only a concept specific to modern societies; on the contrary, it is a basic human need shaped within a historical and cultural continuity.

4. Festivity, Promenade, and Public Recreation Culture in the Ottoman Empire

In Ottoman society, the practices of having fun, resting, and coming together were evaluated not only as individual leisure-time activities; but also as public events that fulfilled the functions of preserving social order, reinforcing political legitimacy, and reproducing public identity (Ekinci, 2024). In this context, festivities, promenades, and various entertainment organizations in the Ottoman Empire indicate the existence of a planned and multi-layered recreation culture (Erdinçli & Can, 2024). The festivities of the Ottoman Empire are comprehensive organizations that were organized especially on the occasion of sultan weddings, prince circumcisions, conquest celebrations, and great state ceremonies, and that could last for days or even weeks (Sevinç, 2025). These festivities are not only elite events addressing the palace environment; but also have the quality of public shows open to the participation of large segments of the public and strengthening social integration. The content of such organizations was recorded in detail through the surnames of the period; and how entertainments, shows, and ceremonies were carried out within an order was clearly documented (Erdoğan, 2022).

Another important element of Ottoman recreation culture is promenade areas. In many Ottoman cities, especially Istanbul, promenade places where the public went on certain days, spent time in nature, and had fun collectively

constituted the spatial counterpart of public recreation. Promenade culture is not only the practice of picnic and strolling; but also includes multi-directional social activities such as listening to music, playing games, chatting, and watching various shows. In this respect, promenade areas can be considered as the historical precursors of modern parks and recreation areas (Karavelioğlu, 2024).

An important dimension of recreational activities in Ottoman society is also bodily and sportive activities. Activities such as wrestling, javelin, archery, and horse races were widely performed both in the palace environment and among the public. Such activities are not only areas where physical skills are displayed; but also have the quality of public shows with a strong spectacle aspect and the potential to produce collective watching and enthusiasm. This situation shows that sport was also an important means of recreation and social cohesion in the Ottoman context (Özmenli, 2024). Baths also have an important place in Ottoman recreation culture. Baths were not only places that met the need for cleanliness; but also functioned as areas of socialization, rest, and bodily-spiritual relaxation. Especially the tradition of going to the bath at special times such as weddings, postpartum periods, and holidays clearly reveals the ritual and recreational dimension of these places. In this respect, bath culture can be read as a historical precursor of the modern spa and wellness understanding (Dokumacı, 2023).

In the Ottoman Empire, the entertainments organized especially during the month of Ramadan also constituted an important part of public recreation (Işık, 2022). Karagöz-Hacivat shows, meddah narratives, orta oyunu, and various stage performances were among the activities in which the public came together, spent time, had fun, and socialized after iftar. These activities both ensured that religious time turned into a social festivity and added vitality to city life. Another remarkable feature of recreational activities in the Ottoman Empire is that these events were largely organized in a planned, timed, and regular manner. The day-by-day programming of festivities, the making of promenade trips at certain times, and the organization of sportive competitions within certain rules show that these activities were not random; but consciously designed public organizations. This situation reveals that recreation in Ottoman society was seen not only as an individual need; but also as a part of social order (Djumanıyazova & Türkmen, 2022).

As a result, the festivity, promenade, and public entertainment practices in the Ottoman Empire indicate a multi-dimensional and institutionalized cultural structure that constitutes the historical foundations of the modern understanding of recreation. These practices once again show that recreation is not only a

product of the modern age; on the contrary, it is a basic social need that has continued to exist under different forms throughout history.

5. Festival, Sports, and Recreation Culture in the Modern World

In the modern world, recreational activities have gone beyond being activities that meet only the individual's need for rest and entertainment; and have become cultural practices that undertake multi-dimensional functions such as identity construction, sense of belonging, search for experience, and psychological well-being (Çam, 2024). With the processes of industrialization, urbanization, and digitalization, the fact that daily life has become increasingly intense, fast, and stressful has made individuals' need for recreational activities even more visible. Today, music festivals, culture-art events, sports organizations, marathons, nature camps, and holiday rituals are among the most common examples of modern recreation culture. Although these events appear modern and secular in form, they show great similarity to historical ritual and festivity practices in functional terms. Through such organizations, the individual temporarily moves away from the routine of daily life, experiences a different time-space experience, and returns from this process with psychological renewal (Testere, 2025).

A remarkable feature of modern recreational organizations is that these events are now constructed within the framework of a conscious experience design understanding (Koçyiğit & Eren, 2024). The arrangement of festival areas, the planning of event programs according to a certain flow, and the step-by-step consideration of the experience that the participant will live from entering the venue to leaving it show that these activities are handled not only as "entertainment"; but as a holistic experience process. This situation can be read as the counterpart in the modern world of the stages of preparation, separation, intense experience, and return seen in historical rituals (Değerli, 2024). Sports activities have also become an important part of modern recreation culture. Stadiums, sports halls, and large sports organizations function not only as areas of physical activity; but also as social spaces where collective enthusiasm, sense of belonging, and common identity are produced. Fan culture, marathon runs, and mass sports events reflect the individual's desire to experience not alone; but as a part of a community (Koçyiğit & Eren, 2024). In addition, in the modern world, practices such as wellness, yoga, meditation, nature walks, and retreat camps also represent a different aspect of recreational activities, and their basis coming from paganism is also present in researches (Aksan & Elnabarawy, 2023). Such activities aim not only for the individual to have

fun; but also to establish inner balance, to relax spiritually, and to reconnect with himself. In this respect, these practices can be considered as the secular counterparts in the modern world of the purification and renewal function of historical rituals.

As a result, although modern recreation culture has differed from the past in form, in functional terms it is in a strong relationship of continuity with the human being's search for meaning, need to be together, and desire for psychological renewal throughout history. Today's festivals, sports organizations, and recreational activities are read as reflections of this long cultural heritage in the contemporary world.

6. How Do Recreational Activities Become More Effective? (Historical Experience Model)

When historical and cultural examples are examined, it is seen that ritual, festivity, and festival practices belonging to different periods and belief systems are structurally shaped around a similar experience construction. The broad historical line extending from pagan period ceremonies to toy and feasts in Turkish culture, from Ottoman festivities to modern festivals and organizations reveals that such collective events have a common logic not only in terms of content; but also in terms of process design (Özkain, 2025). In this context, it can be said that recreational and ritual-qualified events that have been effective throughout history are largely constructed around a six-stage experience model. This model expresses a holistic structure that makes it possible for the individual to detach from daily life, to be included in a collective experience, and to return from this process in a psychologically renewed manner (Testere, 2025).

1. Call (Preparation and Creating Expectation)

The first stage of the process is the announcement of the event, the making of preparations, and the creation of a sense of expectation in the participants. While in pagan periods this call was made through seasonal cycles and sacred calendars; the announcement of festivities days in advance in the Ottoman period and the announcement of festivals and organizations through posters, social media, and media channels in the modern world show that this stage has continued to exist throughout history under different forms. This phase enables the individual to mentally prepare to detach from the daily routine.

2. Separation (Detachment from Daily Life)

In the second stage, the individual separates physically and mentally from the routine of daily life. Change of place, special clothes, travel, and preparation rituals concretize this detachment. Turning to sacred areas in pagan ceremonies,

going to promenade and festivity areas in the Ottoman period, and traveling to festival areas or holiday places in the modern world are typical examples of this stage (Testere, 2025).

3. Threshold / Liminal Area (Entering the Experience)

This stage expresses an intermediate area where the individual is “neither completely belonging to daily life nor completely passed to the new order”. Music, dance, games, rhythmic movements, and bodily participation come into play in this phase. The individual temporarily strips away his ordinary identity and becomes a part of the collective experience. This situation, which is defined as “liminal area” in the anthropological literature, is clearly observed both in historical rituals and in modern festivals (Greco et al., 2025).

4. Peak (Catharsis and Intense Emotional Experience)

The fourth stage expresses the peak point where the experience is lived most intensely in emotional and bodily terms (Ertürk & Öztürk). Enthusiasm, entertainment, emotional discharge, and collective excitement reach the highest level in this phase. Trance states in pagan ceremonies, magnificent shows in Ottoman festivities, and moments of mass enthusiasm in modern festivals show the historical continuity of this stage.

5. Sharing and Togetherness (Reinforcement of the Collective Experience)

In this stage, which comes after the peak experience, individuals share the experience they have lived with others. Practices such as eating together, chatting, spending time together, and producing collective memories strengthen the sense of community and belonging. This phase reinforces that the recreational activity is not only an individual; but also a social experience (Testere, 2025).

6. Return (The Renewed Individual’s Return to Daily Life)

In the last stage, the individual returns to daily life; but now has a psychologically relaxed, renewed, and emotionally purified state. One of the main functions of recreational activity is exactly to create this transformation effect (Demirtaş, 2025). This model shows that whether pagan period rituals, Ottoman festivities, or modern festival and sports organizations are considered, successful and effective collective events largely follow the same structural order. Therefore, in the planning of recreational activities, importance should be given not only to content and program diversity; but also to the holistic construction of the experience within the framework of these stages.

7. Conclusion and Recommendations

This study has addressed recreational activities not only as a product of the modern age; but as the result of a cultural continuity spread throughout human history. The historical line extending from the rituals of pagan periods to toy and feasts in Turkish culture, from public festivities in the Ottoman Empire to modern festival and sports organizations shows that the human need to have fun, to be purified, to come together, and to go outside daily life has continued to exist by changing form.

As revealed in the study, recreational practices that have been effective throughout history have a common structural logic. These activities generally start with a preparation and call process, pass through a transition phase that enables the individual to detach from daily life, then reach a peak point where intense emotional and bodily experience is lived, and finally are completed with the individual's return to daily life in a psychologically renewed manner. This structure can be clearly observed both in historical rituals and in modern recreational organizations.

In this context, it is recommended that festivals, sports organizations, and other recreational activities planned today should be considered not only in terms of content; but also in terms of process design. The construction of the before, during, and after of the event as a whole will increase the depth and permanence of the experience that the participant will live.

For practitioners, the following points can be recommended in the planning of recreational activities:

- Before the event, a preparation process should be designed that will create a sense of expectation and meaning in the participant.
- The event space should be constructed in a way that will enable the individual to detach from daily life.
- At the center of the experience, an intense interaction area should be created in which the participant can be involved in the process physically, emotionally, and socially.
- After the event, complementary elements should be considered that will allow the participant to make sense of this experience and to return to daily life in a renewed manner.

As a result, recreation is not only the evaluation of leisure time; but is a cultural expression of the human being's search for meaning, need to be a community, and desire for psychological renewal throughout history. Taking

this historical and cultural perspective into consideration will make important contributions to the design of modern recreation practices in both a more effective and deeper way.

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CHAPTER 2

Adaptations in Physical Education for Students with Special Needs: Examples from Paralympic Sports

Aykut Şahin¹

“Paralympic sport is built on the values of courage, determination, inspiration and equality.” International Paralympic Committee (IPC)

Abstract

This section addresses adaptation approaches developed to increase the participation of students with special needs in physical education classes and the concrete models offered by Paralympic sports in this process. While emphasising that physical activities support not only physical but also holistic development, it highlights the importance of adapting elements such as equipment, rules, and environment to the student. Paralympic sports are presented as guiding reference sources for teachers on topics such as equipment design and classification systems that can be used in the educational environment. The section argues that adaptation is not a privilege but a fundamental component of inclusive education and offers practical recommendations for educators. Consequently, it explains within a scientific framework how pedagogical strategies can be transformed to create an accessible classroom environment.

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1. Introduction

Ensuring holistic development in an individual's behaviour is achieved through the acquisition of personal and social values. The aim here is to provide opportunities that will enable individuals to take responsibility for themselves and others around them (Hellison, 1995). Merely improving students' physical abilities is insufficient to ensure holistic development. At this point, physical education and sports classes fill an important gap in ensuring students' physical development as well as in instilling social responsibility, personal development, and lifelong physical activity habits (Winnick & Porretta, 2017). However, physical education and sports classes, which play an important role in ensuring the holistic development of students, may be limited in ensuring the active participation of students with special needs in these classes due to reasons such as lack of equipment, the structure of the class, and inadequate teaching approaches (Block, 2016; Şahin, 2025). Eliminating these limitations and ensuring the active participation of students with special needs in physical education and sports lessons necessitates a set of adaptation approaches.

Adapted physical education is defined as a teaching process that aims to ensure the safe and full participation of students with special needs in physical education and sports classes (Sherril, 2004; Winnick & Porretta, 2017). Structures such as the adjustment of environmental conditions, the adaptation of teaching activities to a feasible format, and the adaptation of activities prove that adapted physical education is an approach that aims to increase participation rather than focusing solely on individual limitations. In this context, adapted physical education is not considered a separate practice but rather one of the fundamental components of physical education that aims for the participation of every individual (Lieberman & Houston-Wilson, 2018).

Paralympic sports provide observable examples of how adapted sports activities should be implemented. The materials used in Paralympic sports, the established rules, and the adapted environmental conditions offer highly valuable solutions that support the movement capacity of individuals affected by disability and bring out their performance (Brittain & Beacom, 2016). These examples from Paralympic sports are not merely an application designed for elite athletes to participate in sports; they can also serve as an instructive reference for teachers in physical education and sports classes on how an adapted physical education approach should be implemented.

This section aims to highlight the importance of adaptation in physical education and sport for individuals with special needs and to demonstrate how adaptation approaches can be implemented in physical education and sport

lessons through examples selected from Paralympic sports. The section also aims to provide practical content to support adaptation activities for physical education and sport teachers and teacher candidates.

2. The Importance of Adaptation in Physical Education

Physical education and sports lessons pose challenges for students with special needs due to their inherent characteristics of physical movement, performance for success, and social interaction. At this point, adapting all activities to eliminate the shortcomings of students with special needs and focus on their individual characteristics is a fundamental teaching strategy that will increase participation (Block, 2016). Therefore, the adaptation approach is based on organising physical education and sports lessons according to the student's needs rather than expecting the student to adapt to the lesson.

The primary and most important aim of adaptation is to ensure that students with special needs participate actively in physical education and sports lessons. When an environment and activities suitable for students with special needs are not designed, students remain passive, and this situation leads to feelings of exclusion (Şahin, 2025). It is stated that planning lessons with adaptations suitable for students is a fundamental element that increases not only their motor development but also their self-efficacy, approval, belonging, and motivation levels towards the lesson (Hodge, Lieberman, & Murata, 2012; Lieberman & Houston-Wilson, 2018). At this point, the importance of adaptation is not only about ensuring physical access but also about a holistic approach that includes emotional and social participation.

Winnick and Porretta (2017) address adaptation approaches across five distinct dimensions: equipment, environment, rules, tasks, and teaching strategies. Equipment and environmental adaptations facilitate the movement of students with special needs, while rule and task adaptations adjust the activity's criteria—such as speed, distance, and target—to suit the student's abilities. Adapting teaching strategies involves elements such as the physical education teacher's choice of appropriate language, form of feedback, and organization of activities. This multidimensional structure of the adaptation approach clearly demonstrates that adaptation is a conscious and planned teaching process (Block, 2016).

The implementation of inclusive physical education and sports lessons is directly related to how adaptation is applied. Inclusive physical education aims to ensure the full participation of all students with disabilities in the

same learning environment, in accordance with universal design principles (Lieberman & Houston-Wilson, 2018). The adaptation approach is the practical application of inclusive physical education and sports lessons. When appropriate adaptations are not made according to the type of disability, physical education and sports lessons become a lesson that makes students with special needs feel excluded. Therefore, lessons with conscious and planned adaptations provide a positive lesson climate by making these students feel that they are a natural part of the learning process (Sherril, 2004).

The fundamental indicator of a physical education and sports teacher providing an inclusive lesson lies in their adoption of adaptation approaches. Therefore, adaptation should not be viewed merely as a technical arrangement that increases the participation of students with special needs in physical education and sports lessons. This approach should be considered a holistic development approach centred on universal design. Consequently, adaptation is recognised as one of the fundamental professional competencies that physical education and sports teachers and teacher candidates should possess (Hodge, Lieberman, & Murata, 2012; Block, 2016).

3. The Concept of Adaptation in Physical Education

All arrangements aimed at ensuring the active and safe participation of students with special needs in physical education and sports activities embody the concept of adaptation. Adaptation in physical education is not merely an approach focused on the type of disability an individual has. It is a concept that centres on the reorganisation of the teaching environment, activities, and materials used according to the type of disability (Block, 2016; Winnick & Porretta, 2017). In this context, adaptation represents a pedagogical approach that requires the lesson to be adapted to the student rather than an approach that expects the student to adapt to the lesson.

The concept of adaptation may be perceived as granting privileges or lowering standards in sporting activities. However, adaptation does not mean abandoning learning objectives; rather, it means enabling the achievement of these objectives in different ways, centred on the student's needs (Lieberman & Houston-Wilson, 2018). Therefore, implementing adaptation in physical education and sports lessons is important and essential for providing an inclusive educational environment. This is because ensuring the holistic development of every student is only possible through lessons that include all students, including those with special needs.

One of the key works on the concept of adaptation and its definition in physical education and sport, the book *“Adapted Physical Education and Sport”* by Winnick (2017) defines this concept as follows:

“Adapted physical education is an individualised programme designed to meet the specific needs of individuals, encompassing physical and motor fitness, fundamental movement skills and patterns, aquatic skills and dance, as well as individual and group games. The term ‘adapt’ generally means to modify or tailor. Adapted sport refers to sport that has been adapted or developed to meet the needs of individuals with disabilities. Based on this definition, basketball is a general sport, while wheelchair basketball is an adapted sport. Goalball (a game designed for those with visual impairments, in which players attempt to roll a ball that emits sound towards the opposing goal) is an adapted sport because it has been developed to meet the specific needs of participants with disabilities. (Winnick, 2017; pp. 4-5).” (Winnick, 2017; s. 4-5).

In another important book, the definition is as follows:

“Adapted physical education is the art and science of developing and implementing a carefully designed physical education teaching programme for individuals with disabilities, based on a comprehensive assessment. This programme aims to equip individuals with the necessary skills to enjoy a rich leisure, recreation and sports experience in order to improve their physical fitness and health.” (Auxter, Pyfer & Huettig, 2005).

The concept of adaptation has recently become the focus of studies in Turkey (Yarımkaaya, İlhan & Uzunçayır, 2022; Karakaş & Yılmaz, 2023; Savucu, 2019; Şahin, 2025). The first comprehensive data source on individuals with special needs in our country is the 2002 Turkey Disabled Persons Survey, conducted in collaboration with the *“Prime Ministry State Institute of Statistics”* and *“the Prime Ministry Directorate for Disabled Persons”* (T.C. Prime Ministry Directorate for Disabled Persons & T.C. Prime Ministry State Institute of Statistics, 2002). This survey revealed that approximately 12.9% of the country’s population at that time lived with at least one disability.

In Turkey, the concept commonly used instead of adapted physical education and sport is *“Physical Education and Sport for People with Disabilities”*. This concept is included in the teaching programme of the physical education and sport teaching department as a course title, *“Adapted Physical Education and Sport”*, in line with international literature. Adapted physical education and sport is a teaching approach that aims to provide a variety of lifelong leisure activities for individuals with disabilities, enabling them to gain recreational

and sporting experiences, and is based on individual differences (Savucu, 2019). Consequently, the concept of adaptation in physical education and sport refers to the adaptation of all materials, rules, and teaching strategies that will create an inclusive physical education environment centred on the needs of individuals with special needs.

4. Paralympic Sports: An Adaptation-Based Sport Model

Paralympic sports are an international sporting event held every four years, where athletes with disabilities compete in a format parallel to the Olympic Games. The term “*Paralympic*” is a combination of the words “*parallel*” and “*Olympic*”. This concept demonstrates that the Paralympic Games have a structure that is simultaneous and equivalent to the Olympic Games. First held in Rome in 1960, the Paralympic Games are now held every four years in the cities where the Olympic Games are held, with the participation of numerous athletes with special needs from around the world (Paciorek, 2017).

The Paralympic movement, founded by Ludwig Gutmann in 1948, initially began as a sports-based activity aimed at rehabilitating individuals with spinal cord injuries. The goal of this first step was not only physical recovery but also social integration and community participation. Today, the Paralympic Games have evolved beyond a rehabilitation approach to become a global sports model centred on high-performance sport and equitable and fair competition (Paciorek, 2017; International Paralympic Committee [IPC], 2023b).

Paralympic sports are noteworthy as an adaptation-based sports model for individuals with special needs. The aim of this sports model is not to eliminate the individual’s disability, but to adapt the structure of the sport to suit the individual’s abilities. At this point, it is possible to state that Paralympic sports provide concrete examples of how adaptation can be implemented in a systematic and planned manner (Brittain & Beacom, 2016). The Paralympic Games are based on the principles of equal participation and fair competition. These principles are implemented through adaptation principles. These principles include equipment design, rule adjustments, structuring the sporting environment, and classification systems (IPC, 2025a). Classification systems, in particular, are fundamental to the feasibility of fair competition on the field. This is because, under this system, athletes with special needs are grouped according to their type of impairment and functional capacity, enabling them to compete against each other.

Adapted equipment is one of the distinguishing features of the Paralympic sports model. Running prostheses used in athletics, specially designed chairs used in wheelchair sports, materials containing auditory and tactile stimuli for individuals with visual impairments, and special ball platforms for individuals with muscular disorders are adapted materials that help athletes perform at their best (IPC, 2025a). Adaptations in Paralympic sports are not limited to equipment adaptations. Rule and environment adaptations also feature in these games. Factors such as the size of playing areas, time regulations, contact rules, and starting techniques are restructured according to the type of sport to ensure fair competition for athletes (Winnick & Porretta, 2017). These differences in adaptation demonstrate that adaptation is a process that encompasses all components of sport.

Adaptations used in Paralympic sports also serve as a good example in terms of usability in physical education and sports lessons. The adaptation approach underlying Paralympic sports offers similar adaptations (equipment, tasks, rules, etc.) that can be applied in physical education and sports lessons according to the individual characteristics of students (Block, 2016). Therefore, adaptations in Paralympic sports can be considered not only as an element that enhances performance but also as a model that enables students with special needs to participate in physical education and sports classes.

In Turkey, Paralympic sports contribute to the widespread adoption of an adaptation approach that enables individuals with special needs to participate in sports, particularly through federations dedicated to persons with disabilities and their affiliated clubs. The field practices of the Turkish National Paralympic Committee (TMPK) demonstrate that Paralympic sports represent a sports philosophy based on awareness and inclusivity as well as competition (TMPK, 2025). In this context, it is possible to state that Paralympic sports make a significant contribution to the applicability of adaptations for physical education and sports teachers and teacher candidates. In this context, the adaptations used in Paralympic sports provide a good practice example for students with special needs in physical education and sports lessons and contribute to the social interaction and sense of belonging that individuals will experience by being included in the lessons.

5. Examples of Adaptations from Paralympic Sports

Paralympic sports clearly demonstrate examples where adaptation becomes visible through concrete applications. Adaptations made according to the sport and to ensure the individual's comfort of movement contribute to increasing

participation in sport. In this respect, Paralympic sports constitute an instructive resource with examples of adaptations that can be applied in physical education and sports lessons (Brittain & Beacom, 2016; Block, 2016). This section presents these examples, demonstrating the applicability of the pedagogical objectives of physical education and sports to individuals with special needs.

5.1. Examples of Adaptation in Athletics

Athletics is a Paralympic sport in which adaptations based on athletics are most clearly observed. Running prostheses (blades), specially designed for athletes with lower limb impairments, are an important example of adaptation that enables the individual to perform the running movement. These prostheses are considered tools that enable movement accessibility rather than equipment that enhances performance (IPC, 2025c).

Para athletics athletes compete in each event using specially designed, adapted equipment. In some events, wheelchairs are used, while in others, running prostheses are employed. Visually impaired athletes complete their races with the assistance of a sighted guide. To further increase participation for athletes requiring high levels of support in this discipline, a race walking category has been added to World Para Athletics events (TMPK, 2025). Examples of adaptations in athletics are provided below with images.

Adaptation Example 1: Running prostheses are used for athletes in the athletics discipline with below-knee amputation of the lower extremity (Figure 1).



Figure 1. Running Prosthesis in Para Athletics (Source: Wikimedia Commons, 2025)

Adaptation Example 2: A specially designed wheelchair is used for athletes in the athletics discipline who have a deficiency in the femur region of both legs in the lower extremities (Figure 2).



Figure 2. Wheelchair Athletics (Source: Wikimedia Commons, 2025)

Adaptation Example 3: In athletics, a sighted guide is used for athletes with visual impairments (Figure 3).



Figure 3. Visually Impaired Athlete and Seeing Guide in Para Athletics (Source: Wikimedia Commons, 2025)

Adaptation Example 4: In athletics, athletes with visual impairments perform the long jump with the assistance of a sighted guide using verbal commands (Figure 4).



Figure 4. Visually Impaired Athlete and Seeing Guide in Athletics Long Jump
(Source: IPC, 2025c)

Adaptation Example 5: In the javelin throw event, athletes with physical disabilities perform throws using specially designed wheelchairs (Figure 5).



Figure 5. Athletics Javelin Throw and Adapted Wheelchair Use (Source: IPC, 2025c)

Adaptation Example 6: In the athletics discus throw event, throws are performed with specially designed wheelchairs for athletes with physical disabilities (Figure 6).



Figure 6. Athletics Discus Throw and Adapted Wheelchair Use (Source: IPC, 2025c)

5.2. Examples of Adaptations in Wheelchair Sports

Wheelchairs are an important adaptation used in various Paralympic sports. The use of wheelchairs is quite common in basketball, rugby, tennis, bocce, badminton, dance, table tennis, archery, curling, shooting and athletics. The chairs used in these sports are designed specifically for the sport, unlike everyday chairs, and are designed to enhance the athletes' mobility. The angle of the wheels, the centre of gravity, and the balance structure are among the key elements of the adaptation (Brittain & Beacom, 2016).

Rule adaptations are also made in sports involving wheelchair use. Rules such as ball handling, number of touches, and field usage have been adjusted to support athletes' safety and equal participation (IPC, 2025d). These rule adaptations demonstrate that adaptation is achieved not only through equipment modifications but also through rule and venue adaptations. All adaptations serve as examples for physical education and sports lessons in terms of encouraging active participation among students (Yarımka, İlhan & Uzunçayır, 2022).

Below are examples of wheelchairs being used as adaptation equipment, accompanied by images.

Adaptation Example 7: Specially designed wheelchairs are used for athletes with lower limb impairments in wheelchair basketball (Figure 7).



Figure 7. Wheelchair Adaptation Used for Wheelchair Basketball (Source: International Wheelchair Basketball Federation, 2025)

Adaptation Example 8: In wheelchair tennis, specially designed wheelchairs are used for athletes with lower limb impairments (Figure 8).



Figure 8. Wheelchair Adaptation Used for Wheelchair Tennis (Source: IPC, 2025a)

Adaptation Example 9: In wheelchair table tennis, just like in court tennis, specially designed wheelchairs are used for athletes with lower limb impairments (Figure 9).



Figure 9. Wheelchair Adaptation Used for Wheelchair Table Tennis (Source: IPC, 2025a)

Adaptation Example 10: Specially designed wheelchairs are used for athletes with lower limb impairments in wheelchair curling (Figure 10).



Figure 10. Wheelchair Adaptation Used for Wheelchair Curling (Source: IPC, 2025a)

Adaptation Example 11: Specially designed wheelchairs are used for athletes with physical disabilities in wheelchair dancing (Figure 11). In this discipline, partners may be wheelchair users, but they may also be able-bodied individuals.



Figure 11. Wheelchair Adaptation Used for Wheelchair Dance (Source: IPC, 2025a)

5.3. Examples of Adaptations for Individuals with Visual Impairments

There are important examples of adaptations in Paralympic sports for athletes with visual impairments. The images provided in the examples of adaptations in athletics illustrated a number of adaptations (see Image 3 and Image 4). It is essential that adaptations for athletes with visual impairments include a sensory cue. In goalball and B1 football, adaptations are made using balls that emit sound, while in athletics, these adaptations are made using guide runner applications. These adaptations support athletes in finding their way and performing movements safely (Winnick & Porretta, 2017).

Given the significant importance of sounds for athletes with visual impairments, environmental adaptations must also be implemented. Key components of these adaptations include a quiet playing environment, tactile markings and lines, and the ability to sense field boundaries through touch (IPC, 2025a). In terms of transferring these adaptations to the school environment, they provide important and concrete examples of how auditory and tactile stimuli can be used in physical education and sports lessons (Lieberman & Houston-Wilson, 2018). For example, adaptations are made using tactile stimuli in swimming. During swimming, when an athlete with visual impairment approaches the end of the lane, guides provide a stimulus by touching the athlete with long poles to implement the adaptation. In another example, adaptations are implemented for goalball players to defend against the ball coming towards the goal by silencing the environment and placing a bell inside the ball used. Below are examples of adaptations made for athletes with visual impairments, illustrated with images.

Adaptation Example 12: In goalball, a sport designed for athletes with visual impairments, a goalball ball containing an audible signal is used (Figure 12). Additionally, in this sport, tactile raised markings are placed on the floor to ensure the environment is quiet and to help players locate their positions.



Figure 12. Goalball Branch and Ball Adaptation for Visual Impairment (Source: IPC, 2025a)

Adaptation Example 13: The football branch designed for athletes with visual impairments is called Football B1 and is a Paralympic sport played with both audible cues from the football and environmental adaptations (Figure 13). In addition to ball adaptations in the football branch, there are guides who provide audio cues in three different areas of the pitch. For example, there is a guide who informs an athlete approaching the opposing goal which direction the goal is in.



Figure 13. Football B1 Branch and Ball Adaptation for Visual Impairment (Source: IPC, 2025a)

Adaptation Example 14: A tactile contact adaptation is implemented in swimming for athletes with visual impairments (Figure 14). When the swimmer approaches the end of the lane, they are alerted by a sighted guide using a long pole, and an adaptation is made to indicate the end of the lane.



Figure 14. Swimming for Athletes with Visual Impairment and Tactile Adaptation (IPC, 2025a).

6. Reflections on Physical Education and Sports Lessons

Adaptations made for athletes with disabilities in Paralympic sports provide important data for the inclusion of students with special needs in physical education and sports classes. However, considering that Paralympic sports involve adaptations specific to high-performance athletes, directly transferring these examples to the school environment may not be appropriate. It would be more appropriate to adopt the fundamental principles of adaptations made in Paralympics and transfer them to lessons in a manner suitable for age and instructional design. This approach demonstrates that adaptation in physical education and sports lessons is not a direct copying process, but rather a transfer process with pedagogical foundations (Block, 2016).

Effective adaptations in physical education and sports lessons can be achieved by designing a flexible teaching process that takes into account students' individual differences. Equipment, rule and environment adaptations made in Paralympic sports can be reflected in school through applications such as distance, activity duration, alternative starting positions and individualised pace (Winnick & Porretta, 2017). Such adjustments in the teaching process support the safe and active participation of students with special needs in activities.

Adaptations made in Paralympic sports also expand the role of the teacher in physical education and sports lessons with regard to students with special needs. In these lessons, the physical education and sports teacher acts as an “*adaptation specialist*” who adapts standard activities to suit students with limitations. At this point, it is crucial for the teacher to design the teaching plan and implement adaptations in a way that reveals the functional capacity of the student with special needs (Lieberman & Houston-Wilson, 2018). This approach forms the basis for physical education and sports classes where equal participation in lessons can be ensured.

Adaptations made for physical education and sports lessons in Turkey are also consistent with the Ministry of National Education's (MEB) inclusive education approach. The “*Regulation on Special Education Services*” published by the MEB supports the inclusion of students with special needs in educational environments alongside their peers and encourages teachers to adapt lesson content to the individual characteristics of students (MEB, 2021). In this context, it can be stated that adaptations made in physical education and sports lessons are not merely a personal preference of the teacher but also a corporate responsibility.

Adaptations made in physical education and sports lessons are reported to increase not only physical activity among students with special needs but also their motivation towards the lesson, peer acceptance, and sense of belonging as a natural part of the lesson (Hodge, Lieberman, & Murata, 2012). From this perspective, adaptations contribute to the creation of a positive classroom climate in physical education and sports lessons. Yarımkaya, İlhan, and Uzunçayır (2022) state that adapted physical education and sports lessons should be approached in a planned and systematic manner. This statement requires teachers to anticipate situations that may arise based on individual needs when planning adaptations before class and to respond flexibly to them. Therefore, the examples provided in Paralympic sports serve as a guide because they contain important adaptations for a planned and flexible physical education and sports class. In conclusion, findings from Paralympic sports offer

important inclusion strategies for physical education and sports lessons. They present adaptations and practices that contribute to raising awareness among both teachers and teacher candidates regarding students with special needs.

7. Recommendations for Teachers and Prospective Teachers

An examination of the courses taken by prospective physical education and sports teachers during their training revealed shortcomings in terms of including individuals with special needs in lessons (Şahin, 2025). This situation becomes more challenging when they encounter students with special needs upon starting their teaching career. Therefore, the inclusion of students with special needs in classes, their referral to a Paralympic sport, and the facilitation of their social integration are directly related to the competence of the physical education teacher (Kelly, 2020). In this context, the *“Incluye-T”* resource, which serves as an important guide for teaching activities that can be used during lessons and that can ensure the competence of teachers, can be used as a recommendation (Reina et al., 2019). This guide includes educational activities under the heading of *“para-sports”* adapted for individuals with special needs, which are adaptations of Paralympic sports.

Ensuring that students with special needs participate meaningfully in physical education and sports lessons is related to teachers' knowledge, experience, and pedagogical competence. Indeed, Haegele et al. (2021) stated in their study that ensuring inclusivity for adapted physical education and sports lessons is complex and influenced by many factors. Furthermore, it was emphasised that even in physical education and sports classes with adapted equipment and staff support, factors facilitating the inclusion of students with special needs in classes are insufficient (Haegele et al., 2021).

Adaptations made in physical education and sports lessons are not limited to a single activity but constitute a systematic approach encompassing the entire planning, implementation, and evaluation processes of the teacher (Block, 2016). The key point teachers should focus on is to concentrate on students' functional capacity and individual needs rather than their type of disability during the implementation process, thereby striving to enhance their mobility. Examples from Paralympic sports demonstrate how individuals with different functional characteristics can participate effectively in the same sport. These examples highlight the importance for teachers of applying activities in physical education and sports lessons flexibly according to individual characteristics, rather than applying them uniformly (Winnick & Porretta, 2017).

For prospective physical education and sports teachers, the issue of adaptation is a crucial process linked to the education they receive at university. This education must include content supported by knowledge, skills, and experience tailored to students with special needs, enabling the delivery of inclusive physical education and sports lessons in the future. Examples from Paralympic sports help teacher candidates to concretise the concept of adaptation and develop strategies that can be transferred to the classroom environment. This process will contribute to increasing the self-efficacy of physical education and sports teacher candidates in terms of including students with special needs in their lessons (Lieberman & Houston-Wilson, 2018).

In Turkey, physical education and sports teachers must ensure that their adaptations are consistent with the special education policies implemented by the Ministry of National Education. It is crucial for children with special needs to receive education alongside their peers through integration in order to adapt to social life (Orhan & Genç, 2015). Therefore, it is considered extremely important for the statements set out in the regulations on special education to be in line with physical education and sports lessons in terms of a sustainable education approach (MEB, 2021). In this context, it is extremely valuable for students with special needs that adaptations made using examples from Paralympic sports are not dependent on the teacher's personal preferences but are institutionally required.

The assessments of physical education and sports teachers towards students with special needs stand out as an issue that needs to be reorganised in line with the philosophy of inclusive education. Instead of assessing students in a results-oriented or comparative-performance-oriented manner, an adapted assessment method should be applied that takes into account the student's individual development and measures their level of participation. Assessing students with special needs by taking their individual development into account will also contribute to their feeling of adequacy and acceptance (Hodge, Lieberman, & Murata, 2012).

8. Conclusion

This section, which examines adaptations from Paralympic sports to support the active participation of students with special needs in physical education and sports lessons, provides important information that will benefit teachers and teacher candidates. The adaptation approaches discussed with reference to Paralympic sports provide significant support for making physical education and sports lessons more inclusive, flexible, and student-centred. Adaptation is not only an approach that facilitates the participation of students with special

needs in lessons, but also a fundamental area of professional competence that reveals the physical education and sports teacher's pedagogical approach to sport. Therefore, teachers and teacher candidates should consider adaptations for individuals with special needs as an integral part of physical education and sports lessons and, based on this, structure the planning, implementation, and evaluation processes in a holistic manner.

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CHAPTER 3

Physical Education and Mathematics Integration: An Interdisciplinary Theoretical Model Based on Embodied Cognition and Cognitive Development

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Abstract

In contemporary educational systems, interdisciplinary learning approaches play a significant role in fostering students' higher-order thinking skills. While mathematics is generally associated with abstract reasoning processes, physical education is often regarded as a field focused primarily on physical development. However, recent studies in cognitive science and educational psychology indicate that physical activity supports cognitive performance and academic achievement. The aim of this study is to examine the relationship between physical education and mathematics from the perspectives of embodied cognition theory, executive functions, and constructivist learning, and to propose an interdisciplinary theoretical model. A synthesis of the literature suggests that movement-based learning environments positively influence spatial reasoning, problem-solving skills, and conceptual understanding. The study argues that mathematical learning can be supported through physical experiences and that physical education classes should be restructured as learning environments that strengthen cognitive development.

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Keywords: physical education, mathematics education, interdisciplinary learning, embodied cognition, cognitive development

1. Introduction

Contemporary educational paradigms increasingly emphasize holistic approaches centered on interdisciplinary interaction. Mathematics education, due to its abstract conceptual structure, is often perceived as a challenging learning domain for students. In contrast, physical education, with its movement-, experience-, and sensory-based structure, offers opportunities to concretize learning. In this context, the integration of physical education and mathematics emerges as an innovative learning model that supports both cognitive and physical development.

The embodied cognition approach, which has gained prominence in recent educational research, argues that learning is not limited to purely mental processes; rather, it occurs through the integration of body, movement, and environmental interaction. From this perspective, individuals construct meaning through physical experiences, organize problem-solving processes, and develop cognitive schemas. In terms of mathematics learning, movement-based experiences may contribute to the development of spatial reasoning, pattern awareness, measurement skills, rhythm, and geometry. Therefore, physical education classes provide a strong pedagogical foundation for concretizing mathematical concepts and promoting meaningful learning.

Theories of cognitive development also support the relationship between physical activity and academic achievement. Strong connections have been identified between motor development and executive functions, attention, working memory, and problem-solving skills, particularly during childhood and adolescence. Physical activity enhances brain plasticity, supports neurocognitive processes, and increases motivation for learning, thereby reinforcing the integration of physical education with academic disciplines. This demonstrates that the use of movement-based activities in mathematics learning is grounded not only in pedagogy but also in neuroscience.

The integration of physical education and mathematics encourages experiential, active, and student-centered educational practices beyond simple interdisciplinary collaboration. Through games, rhythm-based activities, sports, and movement-oriented tasks, students can learn mathematical concepts such as number sense, measurement, ratio and proportion, speed, time, spatial relationships, and geometry through lived experience, thereby deepening their conceptual understanding. Furthermore, this integration strengthens the

affective dimension of learning by reducing mathematics anxiety, fostering positive attitudes toward learning, and enhancing academic self-efficacy.

Despite these advantages, much of the existing literature focuses primarily on practical applications of physical education–mathematics integration, while theoretical model development remains limited. This gap highlights the need for robust theoretical frameworks to ensure systematic and sustainable interdisciplinary integration. Combining embodied cognition theory with cognitive development perspectives offers the potential to develop a comprehensive explanatory model.

The aim of this study is to examine the integration of physical education and mathematics within an interdisciplinary theoretical framework grounded in embodied cognition and cognitive development, and to conceptually discuss its contributions to learning processes. Specifically, the study seeks to explore: (i) pedagogical relationships between physical education and mathematics; (ii) the contributions of embodied cognition to mathematics learning; (iii) the effects of physical activity on cognitive development; and (iv) a proposed theoretical model for interdisciplinary learning.

The integration of physical education and mathematics represents not merely the combination of two disciplines, but a holistic paradigm shift regarding the nature of learning. The interaction between movement and cognitive processes holds significant pedagogical potential to make mathematics learning more meaningful, lasting, and motivating. Therefore, developing theoretical models grounded in embodied cognition and cognitive development may contribute to strengthening interdisciplinary learning in future educational approaches.

2. Theoretical Framework

2.1 Embodied Cognition Theory

Embodied cognition theory posits that cognitive processes cannot be explained solely through mental representations; rather, interactions with the body, movement, and the environment are integral to thinking and learning. As an alternative to traditional mind-centered cognitive theories, this perspective argues that learning is constructed through sensory-motor experiences. Individuals are not passive mental entities perceiving the world; they are active organisms who move, experience, and continuously interact with their surroundings. Cognition is therefore understood as a dynamic process shaped by bodily movement capacities, perceptual experiences, and physical interactions.

This perspective provides important insights for mathematics learning. Although many mathematical concepts involve abstract structures, their foundations often lie in physical experience. Concepts such as magnitude, distance, direction, proportion, rhythm, and symmetry are closely related to everyday movement-based experiences. Thus, movement-based learning processes facilitate students' understanding of mathematical concepts and support conceptual learning. Physical experiences during activity enable mathematical relationships to be represented not only symbolically but also at sensory and motor levels, thereby deepening learning.

A core assumption of embodied cognition is that cognitive representations are linked to the body's movement repertoire. Manipulating objects, performing spatial movements, and engaging in rhythmic activities support problem-solving, reasoning, and conceptual structuring processes. Physical education environments therefore provide rich opportunities for developing mathematical thinking. Through sports, games, and movement-based activities, students can experientially explore mathematical concepts such as measurement, timing, speed, angles, geometry, and patterns, linking abstract ideas to concrete experiences.

Embodied cognition also emphasizes the multisensory nature of learning. The integration of visual, auditory, tactile, and kinesthetic experiences strengthens cognitive schema formation. In mathematics instruction, incorporating movement enhances not only symbolic processing skills but also spatial reasoning, attention, executive functions, and problem-solving abilities. Furthermore, physical activity increases motivation, reduces mathematics anxiety, and encourages active participation, reinforcing the pedagogical relevance of embodied cognition.

Another important dimension of the theory concerns metaphorical thinking. Many mathematical concepts are understood through metaphors derived from physical experience. For example, "moving forward and backward" on a number line, "increasing and decreasing" in functions, or "rotation and reflection" in geometry are grounded in movement-based cognitive metaphors. This suggests that students can internalize mathematical concepts more meaningfully through movement-based activities.

In educational contexts, embodied cognition supports active learning, experiential learning, and interdisciplinary integration. The integration of physical education and mathematics provides a practical framework for implementing this theoretical approach. Movement-based mathematical activities enhance conceptual understanding, increase retention, and create inclusive learning environments for students with diverse learning styles.

In summary, embodied cognition theory demonstrates that mathematics learning cannot be reduced to purely symbolic or mental processes; rather, it occurs through the integration of body, movement, and experiential interaction. This perspective strengthens the theoretical foundation of physical education–mathematics integration and provides a comprehensive framework explaining its contributions to cognitive development.

2.2 Neurocognitive Effects of Physical Activity

Physical activity extends beyond supporting motor development; it represents a significant neurobiological mechanism influencing cognitive functions. Contemporary research indicates that regular physical activity positively affects brain structure and function, particularly processes related to learning and academic performance. In this context, physical activity serves as a key factor supporting the neurocognitive foundation of learning.

One of the most significant effects of physical activity is increased brain plasticity. Enhanced blood flow, oxygenation, and the release of neurotrophic factors during movement contribute to strengthened synaptic connections and the formation of new neural networks. These processes accelerate learning, promote long-term information retention, and improve cognitive performance. During childhood and adolescence, physical activity plays a particularly critical role in supporting developing brain structures.

The impact of physical activity on cognition is especially evident in executive functions, which include attention control, cognitive flexibility, working memory, and inhibition. These higher-order cognitive processes form the foundation of mathematical reasoning and problem-solving skills. Individuals who regularly engage in physical activity demonstrate improved attention spans, enhanced task-switching abilities, and stronger working memory capacity, all of which directly influence mathematical performance.

Improved attention control enables students to focus more effectively and actively engage in learning. The increased arousal associated with movement enhances cognitive processing efficiency and reduces susceptibility to distraction. This is particularly beneficial in cognitively demanding tasks such as mathematical problem-solving.

Working memory, a critical component in mathematics learning, supports the mental retention of intermediate steps, symbolic transformations, and simultaneous information processing. Physical activity's positive effects on working memory facilitate more effective mathematical operations and complex problem-solving. Similarly, enhanced cognitive flexibility strengthens students'

ability to develop alternative solution strategies and adjust approaches when necessary.

Beyond executive functions, physical activity supports spatial reasoning, temporal perception, and motor planning—skills crucial for understanding geometry, measurement, speed, and proportional reasoning. Consequently, physical experiences contribute to the experiential and spatial structuring of mathematical concepts, not merely their symbolic representation.

Physical activity also influences affective processes through neurochemical changes that reduce stress and anxiety, creating a cognitively optimal learning environment. Reduced mathematics anxiety allows students to engage more flexibly in problem-solving and exploration without fear of failure, thereby enhancing academic self-efficacy and motivation.

From an educational perspective, the neurocognitive effects of physical activity reinforce the theoretical basis for integrating physical education and mathematics. Movement-based mathematical activities support executive functions, enhance cognitive performance, strengthen learning retention, and facilitate meaningful conceptual structuring. Thus, physical activity should be viewed not merely as a supportive element but as an integral and holistic component of mathematics learning.

2.3 Constructivist Learning Approach

The constructivist learning approach argues that knowledge is not passively received but actively constructed through experience, engagement, and social interaction. Learning occurs when individuals establish meaningful connections between prior knowledge and new experiences. Therefore, instructional processes should prioritize exploration, inquiry, problem-solving, and experiential engagement rather than direct transmission of information.

Constructivism emphasizes the contextual nature of learning. Connecting knowledge to real-life experiences deepens conceptual understanding and enhances retention. In mathematics education, relating abstract concepts to everyday experiences facilitates meaning-making. Physical education classes, through movement-, game-, and sport-based activities, provide rich contexts in which mathematical concepts can be experienced authentically.

The integration of physical education and mathematics aligns closely with constructivist principles. During movement-based activities, students experientially explore concepts such as measurement, timing, speed, angles, geometry, and patterns. For example, measuring distances in sports activities, recognizing rhythmic patterns in movement sequences, or engaging in strategic

planning during games naturally support mathematical thinking within meaningful contexts. Learning thus occurs at experiential and conceptual levels rather than solely at a symbolic level.

Constructivism also underscores the social dimension of learning. Collaborative learning, peer interaction, and communication are central to knowledge construction. Physical education environments, characterized by teamwork and shared problem-solving, enable students to discuss, refine, and reconstruct mathematical ideas collectively. This process supports both cognitive and social development.

Another essential dimension is positioning the learner as an active agent. Encouraging students to manage their own learning processes, formulate hypotheses, and derive conclusions from experience fosters higher-order cognitive skills. Movement-based mathematical activities promote inquiry-based learning and enhance critical thinking, problem-solving, and creativity, transforming mathematics from mechanical computation into meaningful learning.

Constructivism further highlights the role of affective factors such as motivation, interest, and self-efficacy. Engaging and interactive physical education-based mathematical activities foster positive attitudes toward mathematics, reduce anxiety, and enhance intrinsic motivation.

In conclusion, the constructivist learning approach provides a strong pedagogical foundation for the integration of physical education and mathematics. Movement-based, experiential, and contextual learning environments enable students to actively construct mathematical knowledge, deepen conceptual understanding, and strengthen retention. Within this framework, physical education emerges as an effective learning domain for implementing constructivist principles in mathematics education.

3. Conceptual Connections Between Physical Education and Mathematics

3.1 Spatial Reasoning and Geometry

When examining the relationships between physical education and mathematics, spatial reasoning skills emerge as a strong conceptual bridge between the two disciplines. Spatial reasoning is a multidimensional cognitive process that includes perceiving positional relationships among objects, estimating direction and distance, performing mental rotation, and understanding three-dimensional structures. These skills play a fundamental

role in mathematics, particularly in geometry, measurement, coordinate systems, and spatial problem-solving.

Movement activities carried out in physical education classes inherently involve spatial concepts such as direction, angle, distance, and position. Students' movement along specific routes, positioning themselves on a sports field, performing targeted throws, or following rhythmic movement sequences all contribute to the development of spatial awareness. These experiences allow students to transform spatial knowledge acquired in physical environments into mental representations and connect them with mathematical concepts.

Research indicating that spatial skills are strong predictors of mathematical achievement highlights the importance of supporting these skills from an early age. In geometry learning, processes such as understanding the properties of shapes, interpreting angle measures, recognizing symmetry, and analyzing transformations depend largely on spatial reasoning capacity. Movement-based activities in physical education environments enable students to make sense of these concepts experientially rather than solely at a symbolic level, thereby strengthening conceptual learning.

During movement activities, students change direction, estimate distances, and position their bodies at different angles, contributing to the concretization of geometric concepts. For example, in team sports, players must continuously evaluate angle and distance relationships when adjusting their positions on the field. Similarly, gymnastics, dance, or coordination-based activities support the embodied understanding of geometric transformations such as rotation, reflection, and translation. This process makes the abstract structure of mathematical concepts more accessible through movement.

The development of spatial reasoning is also closely linked to problem-solving skills. The ability to analyze spatial relationships, think from multiple perspectives, and construct mental models provides significant advantages in solving mathematical problems. Physical education activities require students to analyze their surroundings and make strategic decisions during movement, thereby supporting the development of these skills. Consequently, physical experiences strengthen visualization skills, a fundamental component of mathematical thinking.

Moreover, the development of spatial skills extends beyond geometry to other areas of mathematics. Spatial thinking plays a critical role in measurement, data interpretation, graph reading, and the visualization of functions. In this context, physical education classes provide supportive learning environments in which

mathematical concepts can be understood through multiple representations grounded in spatial experience.

In summary, spatial reasoning skills lie at the core of the conceptual connections between physical education and mathematics. Movement-based experiences concretize fundamental geometric concepts such as direction, angle, distance, and position, thereby deepening students' mathematical understanding. For this reason, physical education can be regarded as an important pedagogical domain for supporting geometry learning through the development of spatial skills.

3.2 Measurement and Quantitative Reasoning

An examination of the conceptual relationships between physical education and mathematics reveals that measurement and quantitative reasoning constitute another significant connection between the two disciplines. Measurement is a fundamental mathematical process involving the expression of objects' or events' characteristics using standard units. Quantitative reasoning, on the other hand, encompasses the ability to analyze numerical data, make comparisons, interpret proportional relationships, and draw conclusions. These skills are critical both for everyday life and for academic success.

Physical education classes offer rich learning environments in which measurement and quantitative thinking skills can develop within natural and meaningful contexts. Activities such as measuring running times, determining jump distances, evaluating throwing performance, or monitoring heart rates allow students to learn measurement concepts experientially. In this process, students not only practice measurement but also learn to compare, interpret, and evaluate results.

Time-based activities such as measuring running durations help students understand concepts of time units, speed, and pace. By comparing different performances, students can quantitatively evaluate faster and slower outcomes, thereby developing mathematical comparison and ordering skills. Similarly, distance measurements reinforce the use of length units while supporting higher-order cognitive processes such as estimation and evaluating measurement accuracy.

Analyzing physical performance data also contributes to the development of data literacy and statistical thinking. Students can transform collected data into tables or graphs, engage in calculating averages, observe changes over time, and evaluate performance improvement through quantitative analysis.

This process enables students to interpret mathematical concepts related to data analysis and statistics within real-life contexts.

Quantitative reasoning skills are further supported through proportional and relational thinking in physical education activities. For instance, evaluating speed through the relationship between distance and time allows students to discover mathematical relationships. Performance comparisons also help students experientially understand percentage changes, ratios, and differences. This approach supports the development of mathematical thinking as a process of interpretation and meaning-making rather than mere calculation.

Experiential measurement activities in physical education settings also enhance students' estimation and error analysis skills. Evaluating discrepancies between predicted and actual measurements strengthens mathematical reasoning processes and fosters awareness of the nature of measurement. As a result, mathematical concepts are learned in a deeper and more enduring manner.

Furthermore, measurement and quantitative reasoning processes enhance students' self-assessment and performance awareness. By analyzing their physical data, students can monitor progress, set goals, and make strategic decisions. This integration of mathematical thinking with self-regulation strengthens the cognitive dimension of learning.

In conclusion, physical education classes provide natural and meaningful contexts for developing measurement and quantitative reasoning skills. Activities such as measuring running times, comparing performance values, and analyzing physical data support students' mathematical measurement, data interpretation, and quantitative analysis skills, thereby strengthening interdisciplinary learning. In this respect, physical education can be considered an important pedagogical domain for connecting mathematical concepts with real-life experiences.

3.3 Data Literacy

Data literacy refers to the ability to collect, organize, analyze, interpret data, and draw meaningful conclusions from it. In today's information society, the increasing reliance on data-driven decision-making necessitates that students acquire data literacy skills from an early age. In this context, physical education classes provide natural and experiential learning environments in which students can interact with data and develop statistical thinking.

Performance data obtained during physical activities offer rich opportunities for fostering data literacy skills. Measurements such as running times, jump distances, repetition counts, heart rates, or team game success rates constitute

concrete examples of data collection processes. Recording, categorizing, and comparing these data support students' abilities to organize and analyze information.

Transforming physical performance data into graphs, tables, or visual representations plays a crucial role in the development of statistical thinking. By presenting data in bar charts, line graphs, or tabular formats, students enhance their visualization skills and more easily identify relationships among variables. This process supports higher-order cognitive skills such as data interpretation, trend identification, and change analysis.

Data literacy also involves comparison and inference-making processes. Through analyzing data obtained from physical education activities, students can evaluate individual or group performance, monitor development over time, and discuss the effects of different variables on outcomes. This supports the development of inferential reasoning, a fundamental component of statistical thinking in mathematics.

Analyzing physical data enables students to experientially learn statistical concepts such as calculating averages, identifying maximum and minimum values, and examining data distribution. This approach facilitates the meaningful learning of mathematical concepts within real-life contexts and enhances retention. Moreover, developing data-based thinking skills strengthens critical thinking and decision-making processes.

Promoting data literacy skills in physical education settings also contributes to students' self-evaluation and goal-setting processes. By analyzing performance data, students can monitor their development, identify strengths and areas for improvement, and set future goals. This supports self-regulated learning while enhancing responsibility and strategic thinking skills.

In conclusion, physical education classes provide authentic, real-life-based learning opportunities for developing data literacy skills. Transforming physical activity data into graphical representations, analyzing and interpreting results, and drawing conclusions support students' statistical thinking, data visualization, and inferential reasoning skills, thereby strengthening interdisciplinary learning. In this respect, physical education can be regarded as an important learning domain contributing to the experiential development of mathematical data literacy.

4. Proposed Interdisciplinary Model

The model proposed in this study consists of three fundamental components:

1. **Movement-Based Cognitive Activation:** Physical activity strengthens executive functions.
2. **Experiential Conceptualization:** Mathematical concepts are learned through physical experience.
3. **Contextual Learning Environment:** Real-life contexts enhance learning motivation.

The interaction of these components creates a holistic learning process.

5. Educational Implications

Curriculum Development

The theoretical approach based on the integration of physical education and mathematics offers significant pedagogical implications that require the restructuring of educational programs. Strengthening interdisciplinary learning supports meaningful and lasting learning by enabling students to apply knowledge across different contexts. In this regard, integrating mathematics learning outcomes with physical education activities during curriculum development can contribute to designing curricula aligned with the multidimensional nature of learning.

From a curriculum development perspective, identifying conceptual alignments between mathematics and physical education learning outcomes is essential. Mathematical skills such as geometry, measurement, data analysis, ratio and proportion, and spatial reasoning can naturally be associated with physical education activities. Clearly defining interdisciplinary connections within the curriculum design will facilitate teachers' planning of integration processes. In this way, mathematical concepts can be concretized through movement-based experiences, making the learning process more effective.

Learning objectives should not be limited to the cognitive domain but should also encompass psychomotor and affective dimensions. The integration of physical education and mathematics supports holistic development by enabling students to apply mathematical thinking skills during physical activities. This approach increases active participation, strengthens motivation, and contributes to the development of positive attitudes toward mathematics.

Adopting an activity-based learning approach in curriculum design is important for the sustainability of integration. Applications such as movement-

based measurement activities, analysis of sports performance data, game-based geometric explorations, and the use of rhythm and pattern activities in mathematical contexts provide interdisciplinary learning opportunities. Systematically incorporating such activities into the curriculum allows students to experience mathematical concepts in real-life contexts.

Teacher collaboration plays a critical role in curriculum development. Joint planning by mathematics and physical education teachers contributes to coherence between courses and ensures effective implementation of integration. This collaboration is essential for designing interdisciplinary activities, developing assessment tools, and coordinating instructional processes.

Assessment is also a crucial component of curriculum development. In integrated instructional approaches, assessment processes should not be limited to traditional measurement tools but should include performance-based and process-oriented evaluation methods. Observing students' use of mathematical concepts during physical activities, evaluating their data analysis skills, and examining their problem-solving processes provide important indicators of interdisciplinary learning outcomes.

Furthermore, flexibility and adaptability principles should be considered in curriculum development. Factors such as school environment, physical facilities, and student characteristics may influence the quality of integration practices. Therefore, designing flexible curricula that offer teachers alternative implementation options will contribute to the broader dissemination of interdisciplinary learning.

Curriculum development efforts aimed at integrating physical education and mathematics make significant contributions to strengthening interdisciplinary learning and supporting students' holistic development. Integrating mathematics learning outcomes with physical education activities concretizes learning, deepens conceptual understanding, and supports academic achievement. In this context, adopting integration-focused approaches in curriculum design will lay the foundation for innovative learning environments aligned with contemporary educational perspectives.

Teacher Education

The effective implementation of physical education and mathematics integration requires teachers to possess sufficient knowledge, skills, and pedagogical competence in interdisciplinary instructional strategies. Since interdisciplinary approaches transcend traditional subject boundaries and aim to integrate learning outcomes from different domains, it is important to support teachers both in subject-matter knowledge and pedagogical content

knowledge. In this regard, teacher education is considered a fundamental element for ensuring the sustainability of integration.

First, preservice teacher education programs should include both theoretical and practical courses on interdisciplinary instruction. Learning how mathematical concepts can be associated with movement-based activities provides a significant advantage in planning integration processes. Teacher candidates should be encouraged to develop sample lesson plans, engage in practice-based activities, and establish conceptual connections between disciplines.

In-service training programs also play a critical role in teachers' professional development. Practicing teachers should be informed about interdisciplinary instructional strategies, experiential learning approaches, and movement-based mathematics activities. Through workshops, applied seminars, and professional learning communities, teachers can share best practices, collaboratively plan lessons, and develop solutions to encountered challenges.

Supporting pedagogical flexibility and creativity is another important dimension of teacher education. Interdisciplinary instruction requires contextually designed learning experiences rather than fixed templates. Therefore, teachers should develop skills in designing student-centered, problem-based activities that address diverse learning styles. Planning movement-based mathematics activities requires a holistic perspective that simultaneously considers both mathematical learning outcomes and physical education objectives.

Teachers should also be supported in assessment processes. In interdisciplinary applications, not only academic outcomes but also process-oriented gains are important. Teachers need to develop performance-based assessment tools, use observation forms, and monitor both students' cognitive and psychomotor development.

Developing a culture of collaboration among teachers is another key component of teacher education. Joint planning between mathematics and physical education teachers enhances the quality of integration. Such collaboration ensures deliberate connections between subjects, coordinated instruction, and holistic learning experiences for students.

Finally, the use of technological tools should be considered in teacher education processes. Analyzing performance data digitally, using graphing software, and supporting movement-based learning applications can make interdisciplinary instruction more effective. Developing teachers' digital

pedagogical competencies will contribute to implementing integration in alignment with contemporary educational practices.

For successful implementation of physical education and mathematics integration, teachers must be systematically supported in interdisciplinary instructional strategies. Structuring preservice and in-service training programs accordingly, encouraging teacher collaboration, and fostering pedagogical creativity will enhance the quality of integration-based instructional practices. This approach will contribute to establishing a holistic educational perspective that supports both cognitive and physical development.

Assessment and Evaluation

Instructional processes based on the integration of physical education and mathematics require the restructuring of assessment and evaluation approaches in accordance with the nature of interdisciplinary learning. While traditional assessment methods often focus on measuring knowledge levels and procedural skills, integrated learning environments emphasize evaluating students' multidimensional performance. In this context, assessment should encompass not only mathematical accuracy but also problem-solving skills, data interpretation processes, and strategic thinking capacities demonstrated during movement-based activities.

Performance-based assessment approaches more comprehensively reflect interdisciplinary learning processes because they allow students to demonstrate knowledge and skills through real-life-related tasks. In the context of physical education and mathematics integration, tasks such as measuring during physical activities, analyzing collected data, comparing results, and developing mathematical inferences provide appropriate outcomes for performance-based assessment. These applications reveal the depth of learning by demonstrating students' ability to use mathematical knowledge contextually.

In integrated instructional environments, assessment processes should adopt a holistic structure encompassing cognitive, psychomotor, and affective dimensions. Students' ability to apply mathematical concepts during physical activities, their data collection and interpretation processes, and their attitudes toward learning are key indicators of interdisciplinary learning. Therefore, assessment tools should be diversified to allow observation and analysis of movement-based mathematical performance.

Alternative assessment tools such as observation forms, performance tasks, project-based assignments, and learning portfolios offer effective options. Activities such as converting physical performance data into graphs, calculating averages, tracking development, or completing movement-based

problem-solving tasks support authentic assessment processes. This approach demonstrates students' ability to use knowledge not only at the recall level but also at the application and analysis levels.

Formative assessment processes play an important role in integrated learning environments. Ongoing feedback enables students to improve their learning, recognize errors, and adjust strategies. Particularly in movement-based mathematics activities, immediate teacher feedback contributes to improving both physical and cognitive performance. Summative assessments complement this process by determining overall learning outcomes.

Self-assessment and peer-assessment practices also strengthen interdisciplinary evaluation processes. When students analyze their own performance, interpret their data, and provide feedback to peers, they develop metacognitive awareness and self-regulation skills. This supports an assessment approach centered not solely on the teacher but on active student participation.

The integration of technological tools into assessment processes further facilitates monitoring interdisciplinary learning. Digital data collection tools, graphing software, and performance tracking applications allow students to analyze and visualize data obtained from physical activities. This supports the development of data literacy skills and ensures that assessment processes are conducted systematically and transparently.

Adopting performance-based and alternative assessment approaches in physical education and mathematics integration provides a comprehensive understanding of learning's multidimensional nature. Process-oriented, authentic, and student-centered evaluation practices enable students to demonstrate their mathematical and physical skills holistically. Structuring assessment practices to support interdisciplinary learning is therefore a crucial educational factor in enhancing the effectiveness of integration-based instructional approaches.

6. Discussion

The integration of physical education and mathematics offers a holistic educational approach grounded in the understanding that learning should not be limited to cognitive outcomes but addressed together with physical, affective, and social dimensions. By acknowledging the interaction between movement and cognitive processes, this approach transforms mathematics learning from an abstract symbolic level into an experiential and meaning-based structure. Thus, students construct mathematical concepts not only through mental operations but also through embodied experiences.

Movement-based learning environments contain significant elements that enhance students' motivation toward learning. Active participation, gamified activities, and physically interactive processes increase engagement and voluntary involvement. Particularly in reducing mathematics anxiety, physical education-based activities create a positive learning climate. Evaluating success not solely by correct answers but by participation and experience strengthens students' self-efficacy perceptions.

From the perspective of conceptual understanding, the integration approach allows mathematical knowledge to be experienced through multiple representations. Exploring spatial relationships through physical movement, conducting measurement and data analysis using real performance data, or relating patterns to rhythm and coordination activities facilitate the meaningful contextualization of abstract concepts. This contributes to deep learning rather than superficial understanding.

However, various structural and pedagogical limitations may arise in the implementation process. Curriculum density, limited instructional time, and insufficient time for interdisciplinary planning can challenge sustainability. In exam-oriented educational systems, pressure to complete prescribed learning outcomes may limit teachers' engagement with innovative and integrative practices.

Teacher competencies also constitute a determining factor. Interdisciplinary instruction requires not only content knowledge from two domains but also pedagogical design skills, collaborative culture, and flexible teaching strategies. The ability of mathematics and physical education teachers to jointly plan lessons, address learning objectives holistically, and apply alternative assessment methods directly affects the success of integration. Therefore, structuring teacher education and professional development programs accordingly is of critical importance.

International educational reports emphasize that learning processes should not be confined to academic content delivery and that students' emotional well-being and physical activity levels significantly influence academic performance. Considering social-emotional and physical dimensions positively affects core cognitive processes such as attention, self-regulation, and motivation. In this context, interdisciplinary approaches play an important role in transforming education systems into more inclusive and student-centered structures.

Educational transformation requires the dissemination of approaches that recognize the multidimensional nature of learning and integrate different disciplines. The integration of physical education and mathematics can be

viewed as a concrete example of this transformation. Movement-based learning experiences bridge academic knowledge and life experience, strengthening students' ability to transfer knowledge. Moreover, this approach supports not only academic achievement but also students' physical health and psychosocial development.

In conclusion, physical education and mathematics integration presents an innovative pedagogical perspective that unifies cognitive and physical dimensions of learning. Despite its strengths—such as increased motivation, conceptual depth, and experiential learning—factors such as curriculum structure and teacher competencies must be carefully addressed. Systematically supporting interdisciplinary approaches will contribute to the evolution of education systems toward more holistic, flexible, and student-centered models.

7. Limitations and Future Research

This study is theoretical in nature and is based on a synthesis of the literature. Future research should test the effectiveness of the proposed model through experimental studies. Additionally, research conducted with different age groups and in diverse cultural contexts would make significant contributions to the literature.

8. Conclusion

The integration of physical education and mathematics emerges as an effective pedagogical approach grounded in the multidimensional nature of learning, enabling meaningful connections between students' cognitive processes and embodied experiences. Rather than addressing mathematics learning solely at the level of abstract symbols and procedures, this approach enriches it through movement, experience, and interaction, thereby deepening conceptual understanding. Students experience mathematical knowledge in real-life contexts, enhancing retention and meaningful learning.

Movement-based learning environments support fundamental components of learning such as attention, motivation, and self-regulation by encouraging active participation. Measurement, data collection, comparison, and spatial analysis processes conducted during physical activities contribute to the development of mathematical thinking skills within authentic learning contexts. This not only enhances academic achievement but also supports the development of problem-solving, critical thinking, and higher-order cognitive skills.

The integration approach also positively influences students' affective characteristics. Gamified and movement-oriented learning processes reduce

mathematics anxiety, foster positive attitudes toward the subject, and make learning more accessible. In this sense, physical education classes provide an alternative and supportive learning environment for mathematics education.

From a curriculum perspective, systematically integrating interdisciplinary approaches into educational programs is a significant necessity. Associating mathematics learning outcomes with physical education activities strengthens students' ability to transfer and apply knowledge across contexts. However, effective implementation requires supporting teachers in interdisciplinary instructional design, developing instructional materials, and adopting flexible assessment approaches.

Physical education and mathematics integration offers a student-centered, experiential educational perspective that simultaneously supports academic learning and physical development. Movement-based learning environments contribute to meaningful, lasting, and transferable understanding of mathematical concepts. Therefore, promoting interdisciplinary approaches in educational policies and curriculum development should be considered an important strategy for enhancing learning quality and supporting students' holistic development.

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CHAPTER 4

The Theoretical Reconstruction of Physical Education and Sport in the 21st Century: An Integrative Paradigm in the Context of Embodied Cognition, Neuroplasticity, Complexity Theory, and Artificial Intelligence

Tuğba Diker¹

Abstract

The field of physical education and sport has long been framed within physiological performance, motor skill development, and competition-oriented pedagogical approaches. However, contemporary findings in neuroscience, transformations in cognitive science, digitalization, and sustainability crises necessitate a reconceptualization of this field. This chapter reconstructs physical education and sport through the lenses of embodied cognition theory, neuroplasticity, ecological dynamics, complexity theory, and AI-supported pedagogical systems. Movement is conceptualized not merely as a biomechanical output but as a cognitive, emotional, social, and ethical act. The proposed theoretical model argues that physical education constitutes a central component of human development and repositions the field within the

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frameworks of sustainable human development, digital ethics, and inclusive education.

Keywords: Physical education, embodied cognition, neuroplasticity, complexity theory, sport pedagogy, artificial intelligence, sustainability, inclusive education

1. Introduction: Moving Beyond Disciplinary Boundaries

Physical education and sport have often been positioned within modern education systems as auxiliary subjects, health-supporting practices, or competition-based performance domains. However, contemporary scientific literature demonstrates that movement plays a constitutive role in human cognition, emotional regulation, social identity formation, and ethical reasoning.

The central thesis of this chapter is as follows:

Movement is not an external extension of the human mind but a constitutive component of the cognitive system.

This perspective requires an ontological shift beyond Cartesian mind–body dualism. Physical education should therefore be understood not merely as physical competence development but as a domain of movement-based cognitive and social intelligence production.

2. Philosophical Foundations: Reinterpreting the Unity of Mind and Body

2.1 Critique of Cartesian Dualism

Modern educational thought has been profoundly influenced by Descartes' epistemology grounded in mind–body separation. This approach elevated mental activity while relegating bodily activity to a secondary position. Contemporary cognitive science and phenomenology, however, challenge this division.

Merleau-Ponty's phenomenology of the body suggests that the body is not merely a physical object but our primary means of experiencing the world. Movement shapes the subject's relationship with meaning and reality.

From a phenomenological standpoint, physical education occupies a central position in the subject's existential experience.

2.2 Embodied Cognition Theory

According to embodied cognition theory, cognitive processes do not consist solely of abstract symbolic operations; rather, they emerge through interaction among body, environment, and action.

Within this framework:

- Spatial concepts derive from bodily orientation experiences.
- Mathematical abstraction is related to motor patterns.
- Linguistic metaphors are grounded in bodily experiences.

Physical education classes provide experiential environments that strengthen students' abstract cognitive schemas. For example:

- Team sports activate strategic decision-making processes.
- Balance exercises support executive functions through cerebellar activation.
- Rhythm and coordination activities enhance temporal processing capacity.

Thus, physical education is not peripheral but central to cognitive development.

3. Neuroscientific Foundations: Movement and Brain Plasticity

3.1 Neuroplasticity and Motor Learning

Neuroplasticity refers to the brain's capacity to undergo structural and functional changes in response to experience. Regular physical activity:

- Increases synaptic density
- Enhances brain-derived neurotrophic factor (BDNF) production
- Expands hippocampal volume
- Strengthens prefrontal cortex functioning

Motor learning occurs through the integration of perception, prediction, error correction, and reinforcement mechanisms. Notably, this process parallels the learning principles of artificial neural networks.

Movement-based learning environments reorganize not only the muscular system but also cognitive control networks.

3.2 Executive Functions and Sport

Executive functions encompass attentional control, cognitive flexibility, and inhibition. Sports requiring coordination activate these functions.

Particularly open-skill sports (e.g., team sports) promote:

- Predictive processing
- Rapid decision-making
- Strategic planning under uncertainty

Therefore, physical education is directly linked to academic achievement rather than independent from it.

4. Complexity Theory and Ecological Dynamics

4.1 The Nonlinear Nature of Movement

Traditional pedagogical models conceptualized movement as a linear progression of skill acquisition. Complexity theory, however, reveals learning as a nonlinear, self-organizing dynamic process.

The ecological dynamics approach argues that performance emerges from the interaction among:

- Individual characteristics
- Task demands
- Environmental constraints

Within this framework, the teacher does not dictate movement but facilitates learning by designing constraints.

4.2 Variability and Adaptive Expertise

While traditional repetition-based training models focus on reducing variability, contemporary approaches position functional variability at the center of learning.

Adaptive expertise involves:

- Transfer to novel situations
- Strategic flexibility
- Tolerance for error

This perspective reinforces the role of physical education in lifelong learning capacity.

5. Artificial Intelligence and the Transformation of Sport Pedagogy

5.1 Data-Driven Performance Analysis

Artificial intelligence systems are increasingly used for motion analysis, fatigue modeling, and injury risk prediction. Yet a critical question emerges:

Does technology enhance pedagogy, or does it instrumentalize the human subject?

In educational contexts, AI should not replace teachers but function as an analytical tool that strengthens their decision-making capacity.

5.2 Algorithmic Ethics and Data Privacy

The collection of sports-related data poses risks such as:

- Privacy violations
- Performance pressure
- Data exploitation

Therefore, digital sport pedagogy must be structured within a robust ethical framework.

6. Sustainability and Ecological Sport Education

Sports organizations and facilities often have high carbon footprints. Physical education programs should incorporate:

- Nature-based learning
- Low-carbon activities
- Ecological awareness development

Movement serves as an experiential bridge reconnecting humans with nature.

7. Inclusion and Social Justice: The Transformative Potential of Physical Education

Physical education and sport have historically produced both inclusive and exclusionary practices. Performance-centered assessment systems, gender stereotypes, perceptions of disability, socioeconomic disparities, and cultural norms have fostered invisible mechanisms of inequality within sporting environments. Consequently, physical education should be regarded not merely as a domain supporting physical development but as a critical public space where social justice can be pedagogically constructed.

The fundamental principle is as follows:

Physical education must function not as a domain that reproduces existing social hierarchies but as a learning space that questions and transforms them.

An inclusive sport pedagogy does not merely tolerate differences but recognizes them as foundational elements of structural design.

7.1 Structural Inequalities in Sport Contexts

Inequalities in sport settings often manifest not as explicit discrimination but through normative expectations, such as:

- The acceptance of a single “athletic body” ideal
- Directing boys toward competitive sports and girls toward aesthetic activities
- Separating individuals with disabilities into distinct categories
- Limited access to equipment for students from economically disadvantaged backgrounds

Although these practices may appear pedagogically neutral, they influence the redistribution of social capital. Inclusion therefore requires not only physical access but also critical examination of power relations.

7.2 Universal Design Principles: Difference-Based Pedagogy

Universal design advocates planning learning environments according to a spectrum of differences rather than an “average” student. In physical education, this approach involves:

1. **Multiple Participation Pathways** A learning objective may be achieved through different forms of movement.

2. **Flexible Task Structure** Task difficulty levels are adaptable to individual capacities.
3. **Multiple Assessment Strategies** Evaluation emphasizes process over outcome, incorporating effort, strategy development, and collaboration. Difference is positioned as the starting point of pedagogical design.

7.3 Adaptive Equipment and Technological Support

In inclusive sport pedagogy, the physical environment plays a decisive role. Adaptive equipment is essential for equal participation, including:

- Lightweight balls
- Audio-guided systems
- Grip-support devices
- Digital feedback sensors

Adaptation should not label individuals as exceptional cases but be integrated naturally into the overall classroom design. While technology can enhance inclusion, it may also create access inequalities; thus, digital tools must be distributed according to principles of equity.

7.4 Development-Oriented Assessment Instead of Performance-Based Evaluation

Traditional physical education assessments are often norm-referenced, comparing students to one another. This model reduces natural physical differences to categories of success and failure.

Development-oriented assessment emphasizes:

- Individual progress
- Consideration of baseline levels
- Ongoing formative feedback
- Encouragement of self-assessment

Such an approach diminishes performance hierarchies and strengthens students' self-efficacy.

7.5 Gender, Identity, and Sport Culture

Inclusion extends beyond physical access to identity-based forms of exclusion. Sport culture is frequently structured around:

- Masculine competition norms
- Bodily aesthetic standards
- Heteronormative assumptions

Inclusive physical education supports cultural transformation through:

- Mixed-team structures
- Activities challenging gender stereotypes
- Cooperation-based game models

7.6 Socioeconomic Justice and Access

Access to sport opportunities is closely linked to economic capital. Fee-based club sports, specialized equipment requirements, and facility shortages may deepen inequalities.

Public physical education programs can enhance access equity through:

- Low-cost activity design
- Community-based sport spaces
- School–local government partnerships

In this sense, physical education may function as a policy instrument supporting social mobility.

7.7 Critical Pedagogy Perspective

A social justice–oriented physical education aims to cultivate students as critical subjects rather than passive participants. Students are encouraged to:

- Analyze body representations in sports media
- Question myths of success
- Discuss fair play within ethical contexts
- Reflect on the balance between competition and cooperation

This process reveals sport as not merely physical but also ethical and political.

Theoretical Implications of Inclusive Physical Education

An inclusion- and social justice-oriented approach requires three fundamental transformations:

1. Moving away from a norm-based performance model toward developmental progression.
2. Recognizing diversity as a resource rather than a problem.
3. Repositioning sport as a domain of social transformation.

Physical education should evolve from a space that reproduces inequality into a social laboratory where transformative pedagogical practices are implemented. Inclusive models—grounded in universal design principles, adaptive equipment, and development-oriented assessment—provide the structural foundation for this transformation.

This perspective demonstrates that physical education is not merely a physical domain but also an ethical, cultural, and political field of education.

8. The Holistic Movement Intelligence Model (HMIM): A Multi-Layered Theoretical Framework

The Holistic Movement Intelligence Model (HMIM) is grounded in the assumption that physical education and sport do not merely constitute domains of physical performance; rather, they represent a multilayered human development system encompassing cognitive, emotional, ethical, and ecological dimensions. Moving beyond reductionist performance paradigms, the model conceptualizes movement as a dynamic and meaning-producing mode of interaction between the individual and the environment.

HMIM is structured upon the reciprocal interaction of five core components:

1. Physical Competence
2. Cognitive Flexibility
3. Emotional Regulation
4. Ethical-Digital Awareness
5. Ecological Responsibility

These components do not form a linear hierarchy; instead, consistent with complexity theory, they constitute a dynamic system in which each dimension continuously shapes and transforms the others.

8.1 Physical Competence: The Adaptive Capacity of the Body

Physical competence traditionally includes performance parameters such as strength, endurance, speed, and flexibility. Within the HMIM framework,

however, it is situated within a broader ontological foundation. Physical competence is defined as the organism's capacity to generate adaptive responses to environmental demands.

In this context, physical competence is examined across three interconnected levels:

1. Biophysiological Level Effective functioning of cardiovascular endurance, neuromuscular coordination, and energy metabolism systems.

2. Perceptual-Motor Level Efficient operation of the perception–action cycle, spatial awareness, and temporal precision.

3. Adaptive Performance Level The capacity to develop flexible responses to unexpected situations and reorganize movement repertoires according to contextual demands.

From this perspective, physical competence is not a static performance indicator but a form of movement intelligence capable of adjusting to fluctuating environmental conditions.

8.2 Cognitive Flexibility: Movement-Based Mental Adaptability

Cognitive flexibility refers to the individual's capacity to shift strategies according to changing conditions, integrate multiple perspectives, and make decisions under uncertainty. Sport environments—particularly those requiring open skills—naturally stimulate cognitive flexibility.

Within HMIM, cognitive flexibility is conceptualized through three primary mechanisms:

1. Predictive Processing The athlete anticipates opponents' actions; this process requires coordinated activation of the prefrontal cortex and cerebellum.

2. Error-Based Learning Errors occurring during performance provide feedback that facilitates the development of new strategies.

3. Transfer Capacity The ability to transfer strategic thinking skills acquired in a sporting context to academic or social domains.

From this standpoint, physical education functions as a cognitive training field that strengthens executive functions.

8.3 Emotional Regulation: Somatic Awareness and Self-Management

Emotional regulation refers to the individual's capacity to manage intense emotional states such as stress, anxiety, and competitive pressure. The sporting environment provides a structured setting for emotional regulation practice through controlled stress exposure.

Within HMIM, emotional regulation is examined across four dimensions:

1. **Physiological Regulation:** Breath control and heart rhythm awareness
2. **Cognitive Reframing:** Interpreting failure as a learning opportunity
3. **Social Empathy:** Recognizing teammates' emotional states
4. **Self-Efficacy Perception:** Development of a sense of personal control

These processes demonstrate that sport is not solely a physical domain but also a space for cultivating psychological resilience.

8.4 Ethical-Digital Awareness: Sport Pedagogy in the Algorithmic Age

Contemporary sport performance is increasingly monitored through wearable technologies, biometric sensors, and artificial intelligence-based analytic systems. This transformation necessitates a reconsideration of the ethical and digital dimensions of sport pedagogy.

Ethical-digital awareness addresses three fundamental questions:

1. Who owns the data?
2. Does performance analytics empower the individual or objectify them?
3. Are algorithms fair and inclusive?

Within the HMIM framework, students should understand not only their physical performance but also their digital footprints and data rights. Such awareness promotes critical and ethical use of technology in sporting environments.

Moreover, excessive reliance on digital tools may:

- Increase performance anxiety
- Undermine intrinsic motivation
- Create a perception of continuous surveillance

For this reason, the model positions technology as a pedagogical support instrument while maintaining the human subject at the center.

8.5 Ecological Responsibility: Reconnecting Movement with Nature

Physical education has often been confined to indoor gymnasium settings. However, the evolutionary origins of movement are rooted in interaction with natural environments.

The ecological responsibility dimension includes:

1. Nature-based learning activities
2. Low-carbon sport organizations
3. Sustainable equipment usage
4. Game designs fostering environmental awareness

This dimension relocates movement from an anthropocentric framework toward an integrated human–nature relationship. Ecological sport pedagogy seeks to cultivate individuals who live in harmony with nature rather than dominate it.

Theoretical Contributions of the HMIM

The Holistic Movement Intelligence Model offers three major theoretical contributions:

1. Overcoming the Reductionist Performance Paradigm Movement is conceptualized not merely as physical output but as a cognitive and ethical act.

2. Interdisciplinary Integration The model synthesizes neuroscience, cognitive psychology, artificial intelligence, environmental ethics, and pedagogy within a unified framework.

3. Emphasis on Sustainable Human Development Physical education is repositioned as a domain aligned with sustainable development goals and holistic human formation.

Repositioning Physical Education

HMIM calls for a radical reconsideration of physical education's place within the curriculum. It conceptualizes movement as:

- A tool of cognitive production
- A practice of emotional regulation

- A domain of digital ethical awareness
- A platform for developing ecological consciousness

Accordingly, physical education should not be regarded as a supplementary subject but as one of the central disciplines of human development.

9. Conclusion

Physical education and sport in the 21st century are foundational not only for physical health but also for cognitive development, ethical awareness, and sustainable human existence. The accelerating processes of digitalization, sedentary lifestyles, psychosocial stressors, and environmental crises necessitate a holistic approach to human development. In this context, physical education evolves from a practice aimed solely at enhancing bodily performance into a strategic educational discipline supporting multidimensional human growth.

Movement is a fundamental mode through which humans understand the world. Individuals do not perceive their environment solely through abstract mental representations but through embodied experience. They sense space, perceive time through rhythm, develop confidence through balance, and build social bonds through synchronized movement. Movement is therefore not an external outcome of cognitive processes but one of their constitutive foundations. Learning deepens not merely through abstract knowledge transmission but through experiential participation and embodied interaction. Sporting environments provide dynamic learning contexts that enhance decision-making, problem-solving, strategic thinking, and coping with uncertainty.

Physical education is also an ethical learning space. Values such as fair play, cooperation, responsibility, and adherence to rules are internalized through experiential practice rather than theoretical instruction. Competition becomes not only a test of performance superiority but also a context in which self-regulation and justice are examined. In this sense, sport possesses transformative potential for character development and social consciousness.

From the perspective of sustainable human existence, movement reconfigures the individual's relationship both with their own body and with nature. Nature-based physical activities enhance environmental awareness while cultivating ecological responsibility through embodied experience. Thus, physical education aligns with sustainable development goals as a field dedicated to nurturing environmentally conscious individuals.

Consequently, physical education occupies a central position within education. Education is not merely the production of cognitive knowledge

but the holistic development of the individual. The body is not a passive carrier of this process but an active constitutive agent. Cognition shaped through movement, ethical awareness strengthened through experience, and social responsibility developed through interaction underscore the indispensable role of physical education within educational systems.

In the complex and uncertain conditions of the 21st century, a holistic educational paradigm is required to strengthen mental, physical, and social resilience. At the center of this paradigm lies a movement-based, inclusive, and interdisciplinary approach to physical education. Physical education is not a complementary subject but a fundamental axis of human development. Humans understand the world through movement; education structures and makes conscious this process of meaning-making.

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CHAPTER 5

Analysis of the Relationship Between Planning and Supervision in Schools Supervision

Çetin Tan¹

Önder Şanlı²

Abstract

Given the importance of the educational structure, it is evident that the supervision of educational institutions has gained greater significance. In particular, it is believed that the outcomes obtained before and after school supervision processes will make a significant contribution to the quality or functioning of education. Therefore, the relationship between planning and inspection in school inspections has become much more important. This is because moving in a planned manner before and after school inspections ensures that the main purpose of the inspection is achieved. Consequently, in education management, processes such as planning, determining school objectives, organising resources, and structuring activities in advance are emphasised. Along with supervision, the analysis of the results of the implementation of these plans and the process of taking the necessary corrective measures emerge. For this reason, the subject of examining the relationship between planning and supervision in school supervision has been emphasised. Within

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the scope of the research, quite important conclusions and results related to the subject have been obtained.

Keywords: Inspection, Educational Inspection, Planning and Inspection, School Inspection

Öz

Eğitim yapısının önemi göz önüne alındığında, eğitim kurumlarının denetiminin daha büyük bir anlam kazandığı açıktır. Özellikle, okul denetimi süreçleri öncesinde ve sonrasında elde edilen sonuçların eğitimin kalitesine veya işleyişine önemli katkılarda bulunacağına inanılmaktadır. Bu nedenle, okul denetimlerinde planlama ve denetim arasındaki ilişki çok daha önemli hale gelmiştir. Çünkü okul denetimleri öncesinde ve sonrasında planlı bir şekilde hareket edilmesi, denetimin ana amacının gerçekleştirilmesini sağlar. Genel anlamda bakıldığında planlama olmaksızın denetimin fonksiyonel olamayacağı, bu durumun denetçilerin görevlerini yapmalarını zorlaştıracağı ve yapılan denetimin gerçek bir denetim olmaktan uzak olacağı, denetim sürecinde birçok karışıklığın ve çatışma ortamlarının da doğabileceği ve yaşanabilecek tüm bu belirsizliklerden ve olumsuzluklardan dolayı da denetimin sonuçlarının gerçekçi olmayacağı da söylenebilir. Tüm bu eksikliklerin giderilmesi ve denetimin fonksiyonel bir boyut kazanması için planlamanın yapılması tartışılmaz bir durum olarak karşımıza çıkmaktadır. Sonuç olarak, eğitim yönetiminde planlama, okul hedeflerinin belirlenmesi, kaynakların organize edilmesi ve faaliyetlerin önceden yapılandırılması gibi süreçlere vurgu yapılmaktadır. Denetimle birlikte, bu planların uygulanmasının sonuçlarının analizi ve gerekli düzeltici önlemlerin alınması süreci de ortaya çıkmaktadır. Bu nedenle, okul denetiminde planlama ve denetim arasındaki ilişkiyi inceleme konusu önem kazanmıştır. Araştırma eğitim denetiminde planlama ile denetleme arasındaki ilişkinin yansıtılması açısından önemli bir yere sahiptir.

Anahtar Kelimeler: Denetim, okul denetimi, planlama ve denetleme, okul denetimi

INTRODUCTION

It is widely recognised that education plays a crucial role in human life and societal development. Therefore, for educational institutions or schools within these institutions to achieve their objectives, the existence of a management process is essential.

Planning and supervision are among the fundamental elements of school management. Therefore, they are seen to have complementary and continuous

functions. In particular, elements such as the implementation of educational and teaching activities in schools in line with the desired objectives and the implementation of pre-made plans are noteworthy.

Supervision involves a structure that encompasses the functioning of an institution or organisation, its activities, its compliance with procedures, and many other details. Therefore, the main objective of supervision is to ensure that institutions learn from their mistakes and that the relevant problems are resolved. For this reason, supervision provides opportunities to identify problems, mistakes, or certain issues in the functioning of educational institutions or schools.

School inspection is not limited to assessment and control activities. It also encompasses functions such as development and guidance. Therefore, it is necessary for the inspection process to be based on systematic planning in order to function effectively. Inspection activities carried out without planning risk causing negative effects rather than providing benefits. For this reason, establishing the correct link between planning and inspection is of great importance in terms of increasing efficiency and quality in school management. Due to the importance of the subject, the relationship between planning and inspection in school inspection was examined within the scope of the study.

Problem

Identifying weaknesses that arise during inspections necessitates the management of a solution-oriented process. Therefore, it is evident that planning is also crucial in schools alongside inspections. Acting in a planned manner enables the processes before and after the audit to be carried out in a much more accurate and conscious manner. For this reason, it is recognised that planning and auditing are closely linked in school audits.

Due to the focus on the subject of examining the relationship between planning and supervision in school supervision, all relationships between supervision, supervision principles, supervision in education, and planning and supervision in school supervision that are considered important in relation to the subject, have been examined.

Aim

The aim of the study is to analyse the relationship between planning and supervision in schools. Therefore, it also aims to examine the issues that need to be addressed during school supervision and the planning involved. At the same time, it aims to evaluate issues such as supervision, supervision in

education, supervision in schools, and planning in schools. It is desired that all concepts be addressed within a common denominator and examined from the perspective of the relationship between planning and inspection in school inspection. Among the sub-objectives of the study is to provide an important source of information to the literature on the subject.

Method

This study was designed in conceptual model. Relationship between planning and supervision in schools is one of the most important concepts in education management. It can not be noted that the term ‘relationship between planning and supervision in schools’ is examined and discussed sufficiently in the field of education administration. Within this perspective, this article is an introduction to the concept of relationship between planning and supervision in schools. It aims to improve our understanding of relationship between planning and supervision in schools. In this context, in this article, mainly the concept of planning and supervision in schools has been described and related concepts has been introduced.

THE CONCEPT OF AUDIT

The 19th century management approach reflected a lack of interpersonal relationships, with the internet being used for simple bureaucratic applications. Today, however, there has been a shift away from this management approach, with a process underway towards democratic practices that recognise the importance of interpersonal relationships and participation in quantitative matters (Aydın, 2016).

Auditing is seen as an important part of management and is considered a necessary practice for institutions to achieve their goals. For this reason, there have been significant changes in the understanding and practice of auditing between the past and the present (Duranlı & Limon, 2018).

When examining the literature on auditing, it is evident that numerous studies have been conducted on the subject from the past to the present. These studies reveal numerous definitions related to education. It is thought that the word ‘audit’ emerged as a synonym for the Arabic word ‘examination’. Therefore, it is argued that the term ‘audit’ corresponds to investigation, research, and examination (Erdem, 2006).

Another study related to the concept of supervision indicates that the word supervision has Latin origins. Therefore, it is conceptually defined as the process of checking whether the situation is consistent with the original, identifying

existing errors, and making recommendations related to the management and control of errors. In English, the word “inspection” has long been used instead of the word “supervision”. However, in later processes, the use of the word “supervision” has become widespread again. The most fundamental difference between these two words clearly demonstrates how the concept of supervision has developed over time according to the meanings they have taken on. The term “supervision” corresponds to supervision, careful and strict supervision practices in all sectors. However, it is noted that the same term is also used in the fields of education and law enforcement. Therefore, the need to distinguish between the two fields in terms of control has arisen due to their managerial and organisational similarities (Badavan, 2016).

Audit is defined as a behavioural control method aimed at protecting the public interest or public benefit. Another definition describes it as a planned and systematic activity carried out by impartial individuals outside the organisation according to pre-determined criteria (Kurtbeyoğlu, 2015).

Another definition of audit describes it as a planned and systematic activity. Therefore, the concept of audit is expressed as the detailed examination of the operation of a service, the analysis of the data obtained, and the identification of problems found as a result of the analysis (Duranlı & Limon, 2018).

In pedagogical auditing, it is noted that an approach emphasising guidance, direction, and cooperation has been adopted instead of “close” and “strict control” approaches. In this context, it has been considered that the use of the word supervision would be much more appropriate. However, some people argue that the word supervision is inadequate and inappropriate to fully express the expected situation. For this reason, the idea that the use of the word orientation is more accurate for educational supervision has become widespread (Badavan, 2016).

Audit Principles

The audit process plays a decisive role in determining whether the objectives or targets set in education have been achieved. At the same time, it is considered that there are certain principles that must be carefully observed in the audit process. These principles are as follows (Karakaya & Mazlum, 2010);

- **Planning:** Actions must be taken in accordance with the plan developed during the audit process. It is also recommended that planning be carried out in a manner consistent with principles and procedures.
- **Purposefulness:** The audit must have a specific purpose.

- **Objectivity:** The audit must be free from subjectivity and emotionality, and must be conducted impartially and in accordance with scientific principles.
- **Comprehensiveness:** Everything included in the audit must be considered as a whole. It is also expected to be evaluated and audited in a comprehensive manner.
- **Transparency:** Everything in the audit process must be clearly stated.
- **Democracy:** The auditor must demonstrate democratic behaviour and attitudes throughout the audit period. This is also considered important in terms of the auditee's acceptance of the auditor.
- **Situational Awareness/Relativity:** The current situation and conditions must be taken into account during the audit, and flexibility is required.
- **Leadership:** The auditor must demonstrate leadership and provide guidance or direction to the auditee throughout the audit period.
- **Continuity:** Continuity must be maintained throughout the audit period. Under this principle, any disruptions or deficiencies that arise during the process must be remedied to ensure continuous development.

Types of Audit

It is observed that audit types are expressed in various forms according to different approaches. In order to address deficiencies in education and contribute to improving systems, all activities must be analysed and reviewed in a timely and appropriate manner (Badavan, 2016).

Managers' audit functions require monitoring or auditing to enable continuous and careful evaluation. Intermittent auditing refers to the auditing of any institution or individuals at uncertain times (Baysal & Ada, 2015).

Audits are generally conducted by inspectors appointed by the head office. During the audit, inspectors can analyse the current state of the audit but cannot observe its development. Therefore, intermittent auditing can be defined as the regular auditing of internal activities at regular intervals (Taymaz, 2015).

In the literature, types of control can be categorised into various groups according to their function, medium, or purpose. Some of the important types of control seen in the literature are as follows (Bilgin, 2023);

- Informed Audit / Emergency Audit
- On-site Audit / Documented Audit

- Guided Audit / Free Audit

In an informed audit, it is seen that the auditors inform the audited institution or individuals in advance about the duration, scope and activities to be audited. In the case of emergency audits, the aim is to ensure that the organisation in question is continuously prepared for audits, thereby ensuring the healthy functioning of the organisation. In the case of on-site audits, the activities of the individuals or organisations at the location of the organisation are examined. Within the scope of document review, auditors bring all documents or records during the audit to ensure its completion (Sullivan & Glanz, 2015).

In directed auditing, the audit is initiated by a higher authority. Furthermore, the auditor determines the purpose and scope of the audit. In addition to these matters, the method, nature and other aspects of the audit are also determined. In the concept of independent auditing, the auditor is responsible for conducting the audit in an impartial and objective manner from the moment they assume responsibility for the audit. At the same time, the process is carried out independently and free from influence, at the discretion and initiative of the auditor (Zepeda, 2016).

The concept of revision is seen in stages such as preventive control, corrective control, constructive control, and detection control. During preventive control, negative situations may arise if mistakes are made during the implementation of the planned work in institutions. Therefore, the aim is to avoid place and time errors (Aydın, 2016).

During corrective control, merely identifying and preventing the relevant defects and errors is not considered sufficient. Therefore, the identified deficiencies and errors must be corrected to achieve the relevant objective (Bostancı et al., 2011).

In constructive control auditing, when deficiencies and errors are identified during audits, measures to eliminate them are recommended. Therefore, as in researcher control, activities related to improving the system are investigated, and methods to increase its effectiveness are found (Baysal & Ada, 2015).

EDUCATION INSPECTION

Supervision is seen as a comprehensive concept encompassing all activities aimed at improving teaching in a school institution or organisation. Therefore, supervision is considered to be a very important element within the scope of education (Aydın, 2016).

In approaches such as developmental supervision and differentiated supervision, which emerged as a result of clinical observation, the aim is also to ensure the development of teachers or students during the supervision process (Badavan, 2016).

The basic philosophy of approaches in educational supervision can be summarised as increasing the professional development of trainers or teachers based on the principle of continuous development, improving and developing teachers, and thereby ensuring that students learn more (İlğan, 2012).

Educational supervision is defined as the process of determining whether the activities carried out in organisations comply with the principles and criteria set in line with the desired or accepted aims or objectives. The main purpose of supervision is to determine the extent to which organisational goals have been achieved. Therefore, it is expected that the extent to which the relevant goals have been achieved will be determined, and that the necessary measures will be taken to obtain better results and improve the process (Baysal & Ada, 2015).

It is believed that there are many important aims or objectives in educational supervision. The primary aims are to contribute much more effectively to students' academic success and to improve the structures and adequacy of schools (Sergiovanni & Starratt, 2002).

An important regulation concerning MEB inspectors was published in 2011. According to this regulation, the duties of inspection inspectors are listed as follows (Bilgin et al., 2023);

- Inspection
- Guidance
- Evaluation
- Research
- On-the-job training
- Investigation
- Conducting duties and activities related to investigations

In addition to the above regulation, professional experience requirements were introduced in 2014 for similar matters. In this context, the duties and responsibilities of the school are specified in the relevant MEB regulation as follows (Badavan, 2016);

- Contemporary educational supervision
- Emphasis on human resources

- Development of human resources
- Most efficient use of human resources
- Adoption of a form of supervision that ensures maximum efficiency in the use of human resources

The aim of modern auditing approaches is to create the most suitable conditions and behaviours to achieve the desired outcomes. Consequently, in the current era, where new meanings are being attributed to education, it is evident that the fundamental objectives of education are changing in terms of the content discussed and the methods and tools used. At the same time, it is recommended that teachers continuously renew and develop themselves to adapt to the evolution of education. Another way to ensure growth and renewal is seen as the implementation of contemporary supervision approaches that emphasise professional advice and development. With contemporary supervision practices, the efficiency or impact on learning and learning activities can be ensured more accurately. In the supervision practices seen today, an approach that focuses on teachers' professional development is observed (Memduhoğlu & Zengin, 2011).

Lesson Audit in Schools and Planning Relationship

The Ministry of National Education's 2014 regulatory changes regarding school administrators' or principals' supervision and monitoring of lessons introduced several innovations. With these changes, the supervision of teaching in schools was taken away from inspectors and delegated to school principals, who were previously authorised to carry out supervisory activities. The responsibilities of school principals, as outlined in the "Educational Supervision Guide" prepared for them, are as follows (MEB, 2017);

- Achieving educational goals
- Identifying and addressing positive and negative situations among students
- Preparing plans
- Implementing planned activities
- Teaching teachers to guide their professional activities

The inspection of any lesson organised for guidance purposes is seen as related to preventing existing shortcomings from the teacher's perspective and improving the educational process. Therefore, the inspection of a lesson

organised for control purposes is related to identifying and remedying shortcomings (Dönmez & Demirtaş, 2018).

Lesson monitoring is considered an important process in terms of improving the quality of teaching and teachers. Those who carry out this process must be selected by individuals who have the appropriate qualifications (Aydın, 2016).

Changes have been made to the names of the supervisory subsystems in Turkey. Within this scope, legal regulations have been made regarding changes in the areas of responsibility of the supervisory commission and school inspectors in schools. Therefore, in accordance with legal regulations in Turkey, lesson checks are carried out by school inspectors and school principals. It is stated that the Ministry of National Education is responsible for “institutional supervision” and “seminar and course supervision”. It is noted that administrative controls within the scope of institutional control are divided into two categories: teacher control and other personnel control (Dikmen & Göksoy, 2021).

Considering the current situation in the field of education supervision, innovations were introduced in 2022 to the regulation published in the Official Gazette (Resmi Gazete), No. 2424 on 24 February 2014. Pursuant to the MEB inspection commission regulation published in the Official Gazette (Resmi Gazete), No. 31765 in March 2022, the obligation of lesson inspection was reintroduced with the regulation No. 32160 on 11 April 2023. Therefore, sections 16 and 17 of the regulation concerning the scope and implementation of inspection services are as follows (Resmi Gazete, 2022);

- Classroom inspections may be conducted and are permitted.
- Courses for candidates and contract teachers must be reviewed annually, with particular attention to orientation.
- Teachers identified as having professional deficiencies during the consultation and inspection process, as well as those attending teacher training courses provided by institutions, must be inspected in accordance with the procedure.
- The supervision of courses has been reassigned to inspectors in accordance with the relevant articles.

The supervision duties of the school principal are defined by law in the regulation issued by the MEB supervision commission. Therefore, the supervision duties of the school principal under the law and relevant regulation are as follows (MEB, 2023);

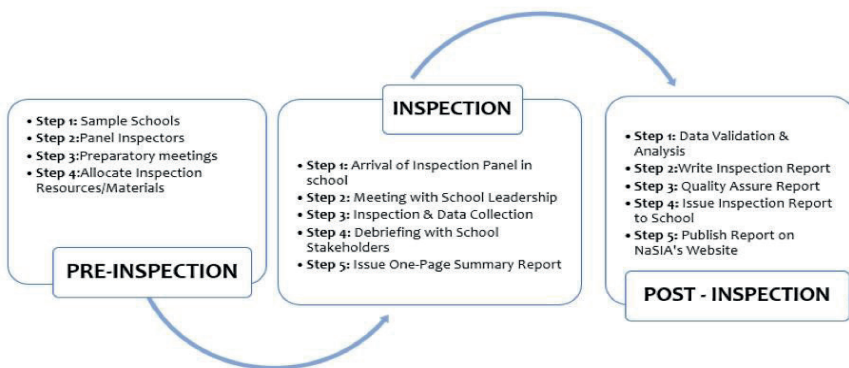
- The headteacher is held responsible for managing the school in line with its objectives.
- The headteacher is held responsible for evaluating the school.
- The headteacher is held responsible for developing the school.

When the importance of supervisory activities is considered in the development of education and teaching activities, the supervision of headteachers is becoming increasingly important. Therefore, it is thought that school administrators or headteachers play a major role in school supervision (Koşar & Buran, 2019).

School leaders must implement monitoring activities effectively. Therefore, school leaders bear significant responsibilities in the development of school stakeholders. Lesson monitoring should be encouraged so that school leaders can evaluate the process and monitor the results much more closely (Dönmez & Demirtaş, 2018).

In school monitoring, principals' monitoring is generally preferred. This is because principals are much more familiar with their teachers than with fetishes, making it easier to identify areas for improvement in teachers' work. At the same time, principals have an important role to play in supervision because they are aware of the activities carried out by teachers and are also aware of activities outside the classroom that are unrelated to teaching (Göksoy & Aslanargun, 2014).

Figure 1: School Inspection



Source: (<https://www.nasia.gov.gh/school-inspections/>)

In addition to assessing the teacher's teaching competence and lesson delivery success, lesson monitoring also aims to address teacher deficiencies, develop their skills, adapt to innovations and changes, and ensure their professional adaptation (Koşar & Buran, 2019).

Teacher monitoring in schools has many objectives. These objectives provide numerous benefits to the school or school education. Some of the objectives of teacher monitoring in schools are as follows (Aydın, 2016);

- Determining the level of educational success
- Identifying positive behaviours
- Providing guidance
- To develop the teaching techniques or methods used in the relevant institution
- To identify and resolve problems in order to provide guidance to teachers

The primary objective of lesson monitoring is to objectively present the learning and teaching behaviours that emerge during the teaching process. Therefore, the objectives of classroom monitoring are listed as follows (Taymaz, 2015);

- Gaining information about the teacher's success in the classroom
- Providing guidance on issues encountered by teachers
- Highlighting the teacher's effective and promising qualities
- Identifying or addressing the teacher's shortcomings in the classroom and in education
- Ensuring coordinated provision of education at school
- Encouraging and motivating teachers to fulfil their duties
- Improving the teaching methods used by teachers in schools
- Increasing confidence in teachers
- Raising awareness through teacher coaching and support programmes
- Assisting in the provision and implementation of teaching resources
- Guiding the analysis of student success using scientific methods

The responsibilities and duties of school principals are expressed in various ways in relevant regulations and studies. When considering the common points of these statements, a common expression emerges, namely that in order to

improve teachers' performance, school principals must observe lessons and provide guidance at least once per academic year. According to Regulation No. 2508, the duties and responsibilities of the school principal are expressed as follows (Marangoz, 2019);

- Taking the necessary measures for the training of prospective staff
- Observing whether teachers use social activity areas such as libraries, sports halls, and laboratories
- Carefully observing teachers' lessons and other activities at various times throughout the academic year
- Managing orientation services for the school
- Taking the necessary measures to ensure the smooth flow of work and the healthy functioning of the school

The primary objective of school principals is to improve education through the best teaching models, programmes, and monitoring methods. Therefore, school principals or administrators have important responsibilities in terms of monitoring and planning (Aydın, 2016).

It is believed that meeting teachers' individual needs, taking teachers' views into account when making decisions, creating a collaborative learning environment, and respecting the dominant position teachers hold in the classroom are among the most important factors supporting the improvement of teaching in schools (Glanz, 2006).

Observing the classroom is considered the most fundamental and important way of gathering evidence within the scope of supervision in schools. Therefore, important impressions are gathered along with the data obtained from classroom observations. The points to be considered in lesson supervision are as follows (Taymaz, 2015);

- **Physical conditions:** Cleanliness and preparation for appropriate use of teaching spaces such as classrooms, libraries, laboratories, computer rooms, and seminar rooms
- **Organisation:** Ensuring that the classroom or school is properly organised
- **Planning:** Planning the institution's lessons or education in a manner appropriate to the objectives
- **Implementation:** Conducting the institution's courses or educational activities in accordance with the plan.

- **Course materials:** Appropriate use of course materials.
- **Discipline:** Compliance of the institution's students and instructors with the rules of the classroom or school.
- **Individual differences:** Ensuring the participation of all students
- **Attention:** Understanding and learning the material
- **Influence:** Being able to change the behaviour of the student or teacher
- **Observation:** Properly observing and analysing the current situation

The most important aspect that an educator or teacher in an educational institution should be able to analyse is their interaction with students. Therefore, interaction with students is one of the most important factors under the teacher's supervision. For this reason, observations made in classrooms represent the most important point of the supervision system (Memduhoğlu & Zengin, 2011).

Other factors such as how well a teacher plans, their collaboration with colleagues, and the communication they establish with parents are also important building blocks of the supervision and planning relationship. Consequently, if classroom practices are not managed correctly, this situation emerges as an area that needs improvement (Danielson, 2012).

In an educational institution, supervision must be carried out according to the specific requirements of teacher training. The required flow plan is chronologically arranged as follows (Taymaz, 2015);

- First, an inspection plan is drawn up.
- Information about the teacher is gathered prior to the inspection.
- A preliminary meeting is held with the teacher.
- The lesson plan and preparations are examined.
- The teacher is informed in advance of the inspection time.
- The classroom is entered together with the teacher.
- An environment for meeting the pupils is created.
- A suitable place is found in the classroom.
- A positive atmosphere is created during the lesson.
- The observer behaves as if they were a natural member of the class.
- The teacher's lessons and delivery are observed.

- Participation in educational activities is ensured while the planned observation is carried out.
- It is monitored whether the teacher uses educational materials.
- The outcome of the lesson or exercise is predicted.
- The classroom is exited together with the teacher.
- Homework and exams are checked.
- Extracurricular activities are taken into consideration.
- A meeting is held with the teacher and the teacher observation form is completed.

In lesson observations, it is expected that the evaluation and the observation objectives are aligned. Therefore, both should support the development of teaching. Due to the possibility of various errors being made in this regard, the most common errors are as follows (Yiğit, 2019):

- Excessive leniency
- Flexibility
- Central tendency
- One-dimensionality
- Inadequacy and deficiency of success standards
- Lack of objectivity in assessment and first impressions
- Lack of innovative attitude
- Failure to consider work dependencies

PLANNING IN SCHOOL INSPECTION

The ability of educational organisations to achieve their objectives effectively and efficiently depends on the systematic and planned implementation of oversight processes. School inspections reveal whether educational and teaching activities are being carried out in line with defined objectives. Consequently, they provide important feedback for improving the quality of the education system. In this context, the unplanned execution of the inspection process leads to a reduction in the expected benefits of the inspection and creates negative perceptions among teachers and administrators. For this reason, planning in school inspections is seen as one of the fundamental elements that directly determines the effectiveness of the inspection (Aydın, 2016).

Planning is of great importance in determining the goals that organisations wish to achieve in the future. It is defined as the process of deciding in advance the paths to be followed in order to achieve these goals. In school inspection, planning involves determining in advance when the inspection will take place, its scope, the criteria to be used, and who will carry it out. Making inspection plans clear and understandable eliminates uncertainties that may arise during the inspection process. It also ensures that the process runs more smoothly. This increases the reliability and objectivity of the inspection process (Taymaz, 2015).

The main purpose of planning in school inspections is to ensure that inspection activities are carried out effectively, systematically and in line with the objectives. The areas to be inspected are determined in advance by clarifying the scope of the planned inspection. At the same time, time management becomes more efficient. A planned inspection process reduces the concerns of teachers and school administrators. It also removes the perception of inspection as a threat and transforms it into a tool for development. This strengthens the educational nature of inspection (Gökçe, 2009).

The planning process for school inspections consists of several stages. In the first stage, the scope and purpose of the inspection are determined. Therefore, the school's current situation, previous inspection results, and priority areas for development are taken into account in the first stage. In the second stage, the measures and data collection tools to be used in the inspection are identified. The third stage involves planning the timing of the inspection and the roles of the inspectors who will be assigned to the task. The systematic execution of these stages contributes to and ensures that the inspection is based on an objective and scientific foundation (Aydın, 2016).

Planning in school inspections ensures that inspections are not carried out randomly. In unplanned inspections, subjective assessments come to the fore and the results of the inspection lose their reliability. Therefore, a planned inspection process allows for the collection of measurable and comparable data. This facilitates the reflection of inspection results in school development plans and contributes to improving the quality of education (Yılmaz, 2010).

Within the scope of contemporary experience, planning is not viewed solely as a means of control. Planned inspection processes also enable guidance for teachers in terms of professional development. Feedback is provided to teachers in line with the objectives set prior to the inspection. At the same time, the development of teaching processes is also supported. With this developmental aspect, planning strengthens the guidance and development function of inspection (Sergiovanni & Starratt, 2002).

THE RELATIONSHIP BETWEEN PLANNING AND INSPECTION IN SCHOOL INSPECTION

The alignment between planning and monitoring directly affects the daily operations of the school. In planned monitoring processes, teachers and administrators know what criteria they will be evaluated against and continue their work accordingly. This reduces uncertainty and creates a more orderly working environment within the school. Disconnect between planning and monitoring, on the other hand, creates a sense of insecurity among school staff and leads to the development of negative attitudes towards monitoring (Gökçe, 2009).

One of the important preparations to be made prior to the audit is determining the criteria and standards to be used in the audit. If the criteria for the audit are not determined in advance, the audit process becomes open to personal assessments. Determining the criteria increases the objectivity of the audit and strengthens the confidence of those being audited in the process. These criteria are generally established in line with legislation, programme objectives and the school's development plans (Başaran, 2008).

The data collection methods to be used must be planned prior to the audit. It must be determined in advance which methods, such as observation, interviews, document review and surveys, will be used. This planning increases the diversity and reliability of the data obtained during the audit process. The unplanned use of data collection methods may lead to incomplete or misleading audit results (Aydın, 2016).

When planning is carried out correctly in school inspections, significant benefits are achieved both before and after the inspection. This is because the aim is to identify any errors observed in the relevant educational institution or school during the inspection. At the same time, it is expected that the necessary plans or steps will be taken to address the identified problems or errors. For this reason, schools or educational institutions that act in a planned manner are seen to be much more solution-oriented before and after the inspection. Furthermore, schools that act in a planned manner before the inspection show a striking preventative effect in terms of the shortcomings that arise during the inspection. Consequently, it is thought that the relationship between planning and inspection is quite strong in school inspections. Otherwise, it is predicted that inspections carried out without planned action will have no contribution and will even have negative effects.

Table 1: Relationship Between Planning and Supervision in School Inspection

Planning	Supervision
The objectives, scope, and priorities of school inspection are determined in advance.	The extent to which the predetermined objectives and priorities are achieved is evaluated.
The areas to be inspected are decided during the planning stage.	Practices related to the determined areas are examined during the supervision process.
The criteria and standards to be used in inspection are established through planning.	Practices are evaluated according to the established criteria and standards.
The timing, duration, and procedure of inspection are defined in the planning process.	Inspection activities are conducted within the defined schedule and procedure.
The data collection methods to be used in inspection are selected during planning.	Inspection data are collected using the selected data collection methods.
The duties and responsibilities of the inspection team are assigned in the planning stage.	Inspection activities are carried out in accordance with the assigned duties and responsibilities.
Development-oriented goals for the school are identified through planning.	The supervision process reveals the level of attainment of these goals.
A roadmap for future improvement is prepared during planning.	Supervision results provide feedback and data for future planning processes.

Source: (Created by the author)

CONCLUSION AND DISCUSSION

The research focused on the relationship between planning and supervision in school inspections. In this context, some very important findings and conclusions were reached.

According to the results obtained within the scope of the research, many issues are targeted in schools or educational inspections. Consequently, it has been determined that the concept of inspection is quite important for institutions to achieve their goals and is a necessity rather than a requirement. At the same time, it is expected that inspection processes in schools will be managed correctly, as they also contribute to factors such as guidance, control, evaluation and problem solving.

When the principles of auditing are examined within the scope of this study, it is seen that issues such as being planned, purposefulness, objectivity, integrity, transparency, democracy, leadership, situational awareness and continuity come

to the fore. Based on this, it can be concluded that the formation of auditing and planning are closely linked.

At the same time, when examining the types of audits, it is seen that types such as informed audit/emergency audit, on-site audit/documented audit, guided audit/free audit stand out. Among the important results highlighted in the scope of the study is that the contributions to be made in these types of audits vary according to the objectives or targets.

It was observed that planning is quite important in educational inspections. This is because the main objective of inspection is to identify certain errors or deficiencies and take relevant initiatives to solve the problem. Therefore, the relationship between planning and supervision was found to be quite important. This is because it is recommended that schools identify certain deficiencies and problems in their supervision and take the necessary steps to solve them. In this context, by acting in a planned manner, the deficiencies and problems that arise can be quickly resolved, making it possible for the school or institution to fulfil its educational quality, functioning, and all its intended principles. Otherwise, it is predicted that schools acting without a plan will continue to experience the same problems after the inspection and that the relevant problems will even grow.

When examining the objectives of lesson observations in schools, the primary aims are to improve school performance and to identify the effective and promising qualities of the school or class. At the same time, it is noteworthy that other objectives include identifying and addressing the shortcomings of teachers in the school, ensuring educational coordination within the school, and encouraging teachers to fulfil their duties. Therefore, the aim is to eliminate all deficiencies in the school in line with guidance and to improve the quality of education by correcting teachers' mistakes. For this reason, it is necessary to act in a planned manner to ensure that the objectives and principles of lessons and teacher experiences in schools are correctly implemented. Consequently, the relationship between planning and monitoring in school inspections has become much more important. At the same time, it is recommended that schools plan correctly and carry out the preparatory stages thoroughly. It is suggested that this should be continued after the inspection to contribute to school success and the quality of education.

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